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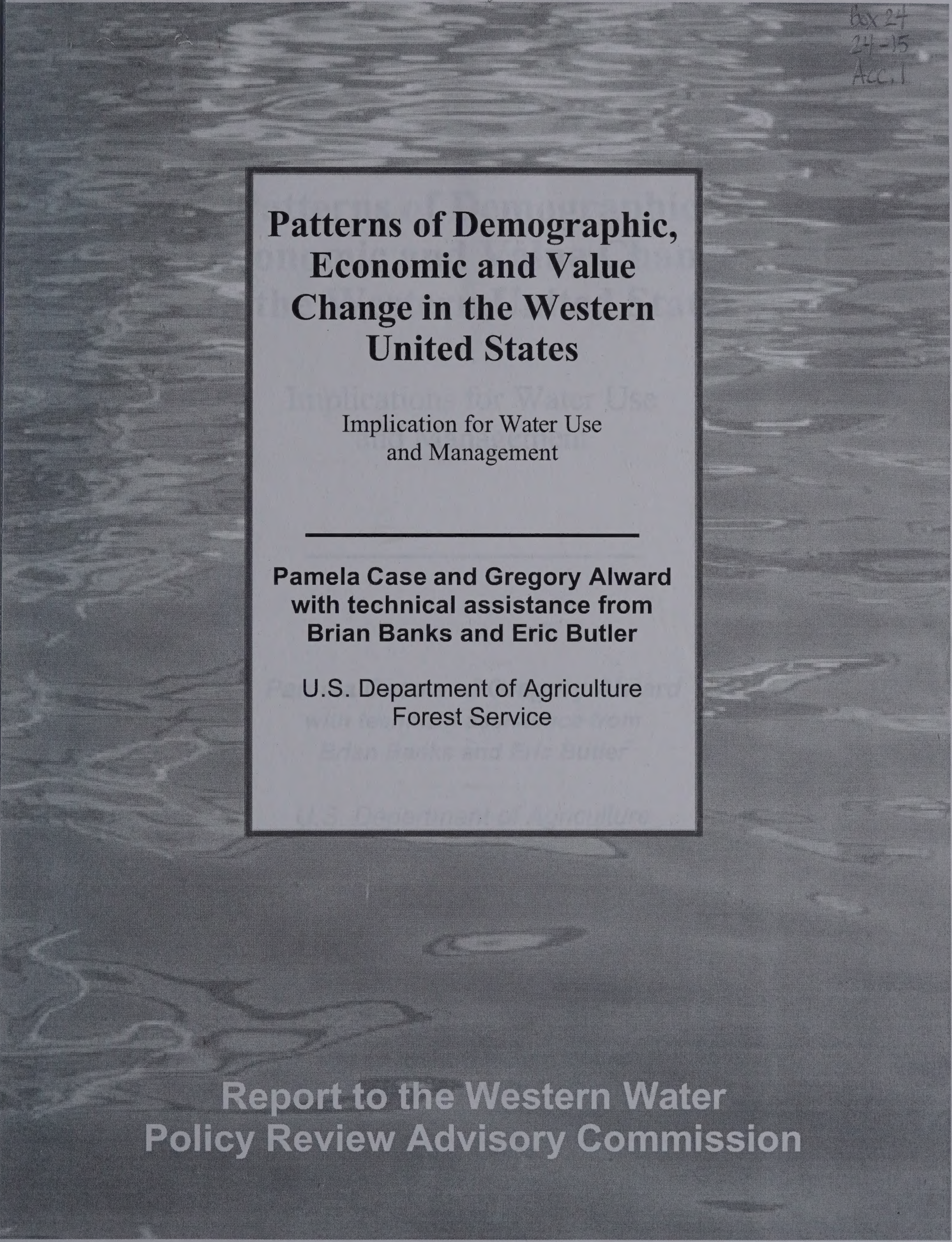

Patterns of Demographic, Economic and Value Change in the Western United States

Implication for Water Use and Management

Pamela Case and Gregory Alward
with technical assistance from
Brian Banks and Eric Butler

U.S. Department of Agriculture
Forest Service

Report to the Western Water Policy Review Advisory Commission

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Policy Review Advisory Commission

August 1997

The Western Water Policy Review Advisory Commission

Under the Western Water Policy Review Act of 1992 (P.L. 102-575, Title XXX), Congress directed the President to undertake a comprehensive review of Federal activities in the 19 Western States that directly or indirectly affect the allocation and use of water resources, whether surface or subsurface, and to submit a report of findings to the congressional committees having jurisdiction over Federal Water Programs.

As directed by the statute, the President appointed the Western Water Policy Review Advisory Commission. The Commission was composed of 22 members, 10 appointed by the President, including the Secretary of the Interior and the Secretary of the Army, and 12 members of Congress serving *ex-officio* by virtue of being the chair or ranking minority member of the 6 congressional committees and subcommittees with jurisdiction over the appropriations and programs of water resources agencies. A complete roster is provided below.

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This is an Independent Report to the Commission

The report published herein was prepared for the Commission as part of its information gathering activity. The views, conclusions, and recommendations are those of the author(s) and are not intended to represent the views of the Commission, the Administration, or Members of Congress serving on the Commission. Publication by the Commission does not imply endorsement of the author's findings or recommendations.

This report is published to share with the public the information and ideas gathered and considered by the Commission in its deliberations. The Commission's views, conclusions, and recommendations will be set forth in the Commission's own report.

Additional copies of this publication may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia, 22161; phone 703-487-4650.

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Introduction

For more than 150 years, the West has beckoned people seeking a better life. Both its people and its economy have burgeoned over the years. Much of the flowering of the West is tied to development of water.

A considerable share of Federal and State water policy in the West is centered on agriculture. In the early days, almost every city, town, village, and family needed to be self-sustaining in terms of food production. Physical self-sufficiency was vital to development of the land, commerce, and the industrial society yet to come. Development of water resources has been essential to agricultural development, particularly in the arid portions of the West. Irrigation increased the yield of planted crops by a factor of five. Nevertheless, the West has been a hard place to make a living. As late as 1940, almost half the West's people were directly employed in farming, ranching, mining, and processing of agricultural and mineral products.[1] A significant fraction of the remainder were employed in allied professions such as the making or selling of farm implements.

It was only at the conclusion of World War II that the West began to acquire an urban and industrial base. The West's economy and population, which had expanded but changed relatively little in essential character for more than 100 years, now began to alter at an increasing rate. Within 25 years, the economy moved from one centered on agriculture and natural resources to one centered on trade, fabrication of a vast array of materials, finished goods, and a growing complement of services. A greater share of the West's water supply went to municipal and industrial use, and to power generation, but agriculture continued to claim the lion's share.

In the last 15 years, demographic and economic patterns in the West have taken a new turn. Further, the pace of change appears to be accelerating. Demographic processes, such as large-scale immigration or the bearing of children in a rapidly growing population, have their own undeniable physical force in the world. These processes have changed and will change the West. It may be that the longstanding balance between agricultural, industrial, and urban uses of water will now began to shift— particularly under the impetus of massive population growth.

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[1] *Water, Land and People: A Report to the Secretary of Agriculture About the Intermountain Region.* United States Department of Agriculture, Southwest - Intermountain Committee, Albuquerque, New Mexico, 1941, page 14.

This report describes, in a nontechnical manner, the changing face of the Western population and economy as it is occurring in the large scale.[2] The report begins with a brief discussion of long-term demographic trends, and then turns to recent patterns of change in demography, economics, social perceptions about the environment, and peoples' values for land, water, and economic prosperity. The second part of the report deals with projections of future population growth and change in the West. It concludes with a brief discussion of the implications these changing large-scale social forces have for water use and management in the West.

Historical Trends in Demography

The development of a region's population and the way in which people deploy themselves on the landscape have much to do with development, use, and management of water, first as cause and then as effect. Demographic patterns are the result of long-term and short-term trends in population growth and movement, evolutions in technology and the economy, and the arrangement of physical infrastructures on the landscape.

Population growth and industrialization are key features of the Western region. In fact, they may now be the most salient features of the West. Because demographic patterns and change in these patterns are "macro" or "superscaler" phenomena (that is, they occur at scales larger than can be seen by individual observation), accurate views of these can only be built up by assembling thousands of pieces of data into coherent pictures. These "pictures" need to be looked at and interpreted in the context of relatively long-term time sequences.

With regard to water policy and population, the most important of the long-term demographic trends affecting water use in the West is the general movement of people from the East to the West in this century.

In 1900, at the beginning of the century, most of the Nation's people lived in the East and were concentrated in the Mid-Atlantic and Lake States regions.

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[2] The "Western" States, in this report, are assumed to include all States west of the Missouri River, save Alaska and Hawaii.

Plate 1 **Population Distribution In 1900**

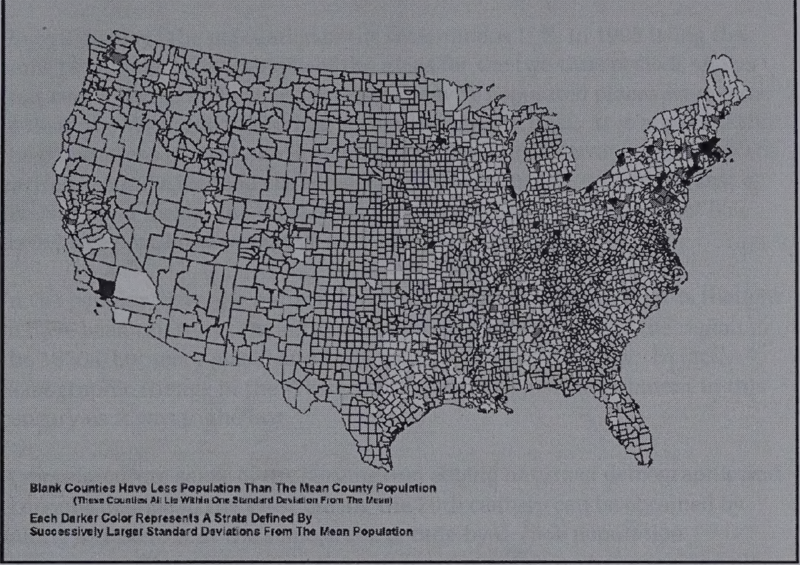
Blank Counties Have Less Population Than The Mean County Population
(These Counties All Lie Within One Standard Deviation From The Mean)
Each Darker Color Represents A Strata Defined By
Successively Larger Standard Deviations From The Mean Population

Plate 1 displays a map of population concentrations in the coterminous U.S. for this year.[3] In this map, the populations of the counties are stratified in terms of the standard deviations occurring in the distribution of the population among the Nation's counties at the time.[4] Counties which had populations smaller than the mean population have no assigned color. Counties with populations larger than the mean are shown in progressively darker colors at intervals marked by the standard deviations. That is, the light green color indicates counties which have populations significantly greater than the mean. Counties in the two darker shades of green are effectively twice or three times as large as the ones in light green.

In 1900, Los Angeles was already heavily populated relative to counties in the rest of the Western States, but it was not nearly as large as many of the Eastern cities and counties. With the exception of Los Angeles, it is apparent that the most heavily populated counties lay in the Eastern U.S.

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[3] All population data used in this report, unless otherwise noted, were collected in the Decennial Census' and published by the U.S. Bureau of the Census, Department of Commerce. These data have been obtained directly from the Bureau of the Census or from the National Archives. (See addendum.)

[4] In plain language, a standard deviation is a commonly used measure of the natural increments or intervals in a set of data which are based on the amount of dispersion taking place in the data.

Plate 2 displays the population of the coterminous U.S. in 1995 using the same technique.[5] Comparison of the maps for the two time periods shows that over a period of 95 years, the most heavily populated places have come to lie in the West and in Florida, rather than in the East. It is apparent that the populations of the Lake States, the interior Mid-Atlantic region, and the entire East have thinned out considerably over time, relative to the rest of the Nation. Florida, the Western Coastal States, and the Southwest now have large populations relative to the rest of the Nation.

In the popular view, the pattern of population growth in the West is thought to have been relatively tumultuous during the "opening up" of the region in the 1850s, but more placid and stable during the 20th century. In fact, demographic change in the Western U.S. has been just as turbulent in this century as it was in the last.

A more accurate sense of the surging and ebbing nature of demographic and economic change in the West during the 20th century can be obtained by taking a close look at the some of the decade-by-decade population movements. Plate 3 describes the pattern of population change taking place in the Nation's counties between 1910 and 1920. Many counties in the East declined in population. But under the impetus of the Homestead Act, many Midwestern and Western counties acquired people: mostly people seeking to make a living by farming the land or ranching livestock. For the Nation as a whole, the Homestead Act launched a considerable amount of movement into the Western landscape.

The map in plate 4 describes the pattern of change which took place in the following decade (1920 to 1930).[6] Many Midwestern counties, and the

---

[5] This technique allows us to view the general location of the more heavily populated areas of the Nation irrespective of the overall amount of population growth which took place during the intervening 95-year period.

[6] A different display technique is used for this series of three maps than was used for those in plates 1 and 2. In this series, the counties are stratified in terms of the natural breaks in the distribution of percent change in their populations. (The statistical technique for finding the natural breaks in the data is known as Jenk's Optimization.) This technique makes patterning in geographical data more apparent to the human eye. The maps are comparable to each other in terms of their overall patterns and the ways the patterns in the data are distributed within a common color scheme: they are not comparable to each other in terms of the increment of percent change represented by each strata. The measures of percent change in the population for each strata for each map are displayed for purposes of information only.

counties of the northern tier of the Western States, declined in population in 10 years just as rapidly as they had built up in the previous 10 years. Land in these areas was not often amenable to farming and ranching, given the technology of agriculture in those times and the very few resources people were able to bring with them. This decade, too, is characterized by a significant amount of demographic movement and economic dislocation.

The map in plate 5 describes the changes taking place in the third decade of the 20th century (1930 to 1940). This period, the time of the Depression and the Dustbowl, is considered to be one of the worst in American history, ranking second only to the dislocations of the Civil War. The wholesale migration of people from the Plains States and their dispersement into and throughout the West is clearly and starkly limned in this map.

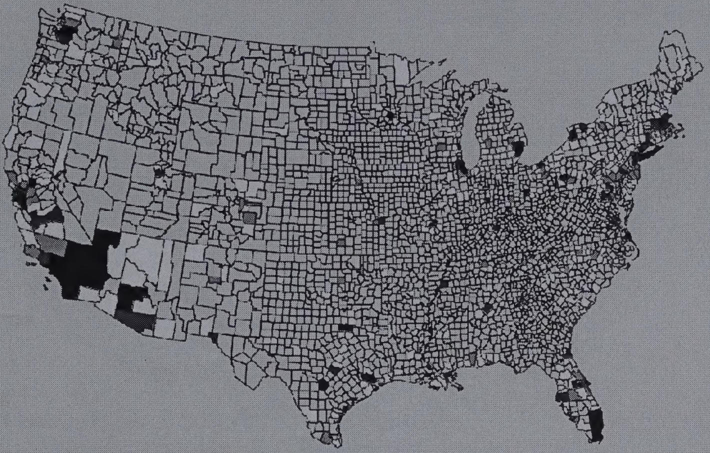
Not every decade in the 20th century has been as turbulent as the first three, but the popular notion that the West was settled in 1850 and has a relatively tranquil history ever since is false. In fact, migrations and movement of people across the Nation to the West have been the norm throughout the region's history. Further, it may be fair to claim that the major period of settlement of the West did not occur in 1850: it is just now taking place.

Current Patterns of Change

The Western States have been going through yet another period of significant change during the last 25 years. Some of the most significant demographic changes have occurred in just the last 15 years. The economy has been changing in important ways, although this has been at a slower rate of change than has been occurring with respect to the population. We believe that people's perceptions and values for the economy and the environment also seem to be evolving in potentially significant ways, although social scientists have begun to measure such changes in only the last few years.

Plate 2

Population Distribution In 1995



Blank Counties Have Less Population Than The Mean County Population
(These Counties All Lie Within One Standard Deviation From The Mean)

Each Darker Color Represents A Strata Defined By
Successively Larger Standard Deviations From The Mean Population

Plate 3

Percent Change In Population Between 1910 And 1920 The Influence Of The Homestead Act

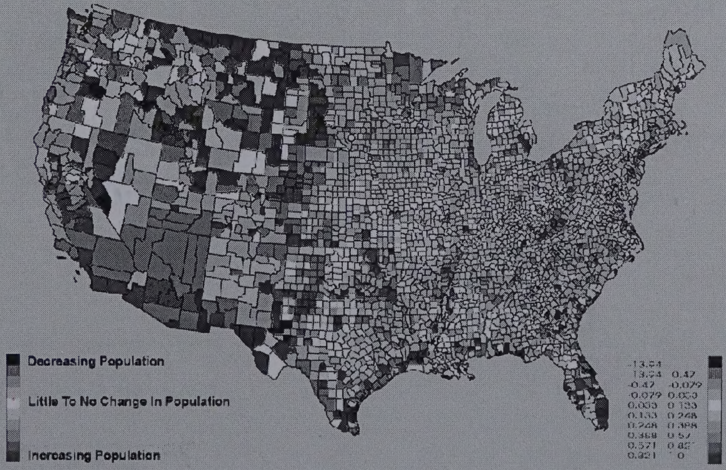

Decreasing Population
Little To No Change In Population
Increasing Population
-13.94
13.94 0.47
-0.47 -0.079
-0.079 0.033
0.033 0.133
0.133 0.248
0.248 0.388
0.388 0.57
0.571 0.82
0.821 0

Plate 4

Percent Change In Population
Between 1920 And 1930
Immediately Following Homestead Act

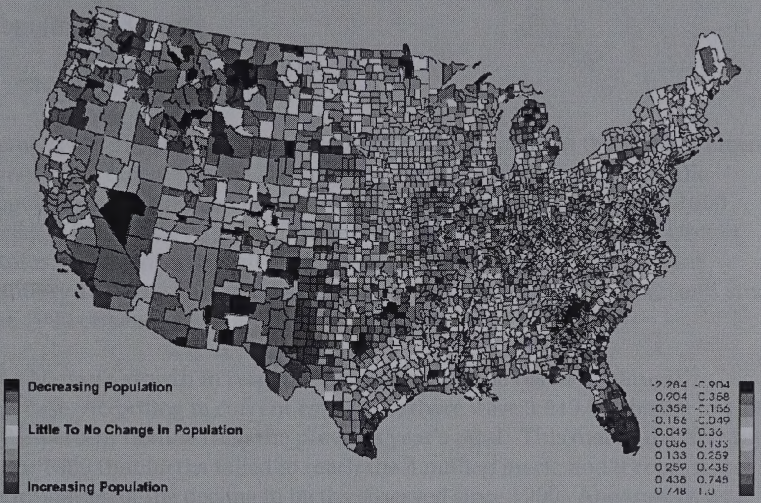
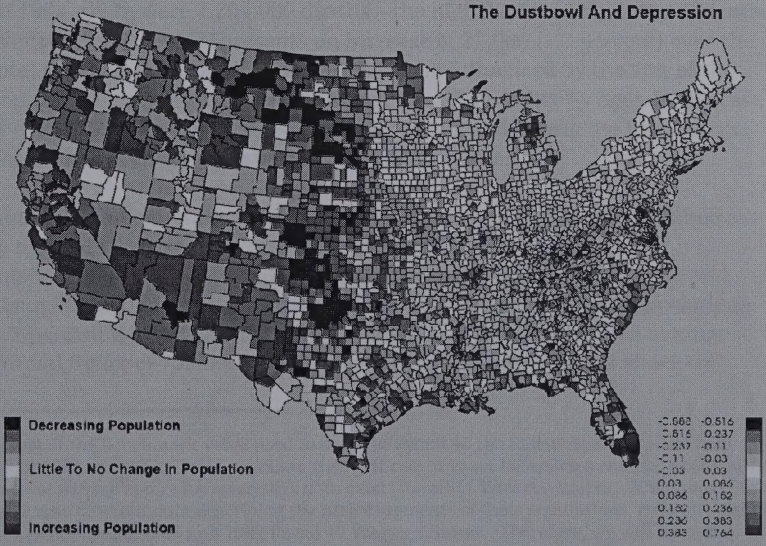

Decreasing Population
Little To No Change In Population
Increasing Population
-2.284 -0.904
0.904 0.368
-0.358 -0.166
-0.156 -0.049
-0.049 0.36
0.036 0.133
0.133 0.259
0.259 0.435
0.438 0.748
0.748 1.0

Plate 5

Percent Change In Population
Between 1930 And 1940
The Dustbowl And Depression


Decreasing Population
Little To No Change In Population
Increasing Population
-0.668 -0.516
0.516 0.237
-0.237 -0.11
-0.11 -0.03
-0.03 0.03
0.03 0.086
0.086 0.162
0.162 0.236
0.236 0.383
0.383 0.764

Population Growth

Changes in the Nation

Some of the important population changes taking place in the West in recent times reflect trends in the Nation as a whole. As of mid-year 1996, the population of the Nation had grown by 13 million persons since the 1990 census. On January 1, 1995,[7] there were 261 million people in the United States. This represents an increase of 2,471,000 (1.0 percent) over the January 1, 1994, estimate, and a gain of 12,919,000 people (5.2 percent) since the 1990 census.

The Nation's growth in recent periods is mostly the result of natural increase. According to current estimates, there were 3,949,000 births in 1994: a 2.2-percent decline from the previous year's total. This marks the first time since 1989 that births failed to reach the 4 million mark, and it represents continuation of the decline in births observed since 1990. Apparently, as a result of the aging of the Baby Boomers, more women across the Nation now are entering their less fertile childbearing years.

In 1994, there were 2,294,000 deaths—the highest annual number of deaths ever recorded. This represents an increase of 27,000 (1.2 percent) over the total for 1993. The number of deaths can be influenced by the size of the population, the age structure, and the rates of mortality by age. In the case of the U.S. in the early 1990s, the major factor underlying the increase in deaths has been the age structure of the population.

About 65 percent of the increase in the population in 1994 was attributable to natural increase. The Nation also experienced a net gain from international migration: 80,000 U.S. citizens returned from abroad, and about 736,000 immigrants moved to the U.S. These numbers represent an 8.3-percent decline (down 67,000) from 1993. Nevertheless, the average annual figure of 759,000 immigrants during the 1990s is well above the

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[7] Most of the benchmark years used to describe people in the following discussions refer to 1993, 1994, or 1995. These years are the most recent years for which a complete body of current demographic characteristics data exists for all 17 Western States. While some States have more current data describing the major segments of their populations, no such statistics are available for 1996 and 1997 for all 17 Western States. Therefore, we will use 1993, 1994, and 1995, where appropriate, as reference years for description of various types of recent population changes.

annual average of 634,000 for the previous decade. This higher average is partly a result of provisions of the Immigration Act of 1990 which reduced the limiting effect of quotas on family reunification. In 1994, international immigration accounted for 28.4 percent of the increase to the total population.

Baby Boomers (people born between 1946 and 1964) continue to concentrate population growth within the age groups into which they age. The Baby Boom cohort (persons 33 to 51 years old on January 1, 1997) accounted for 79,352,000 people, or 30.3 percent of the total population in 1994.

The number of people in elderly age categories also has continued to increase. The number of Americans 65 years or older on January 1, 1995, was 33,362,000, representing an increase of 359,000 (1.1 percent) from 1994, and an increase of 7.3 percent from the 1990 census.

A more pronounced percentage increase is occurring in the oldest segment of the elderly population (those over 85 years of age). The number of people in this category was 3,580,000 on January 1, 1995; an increase of 103,000 (3.0 percent) from a year earlier, and an increase of 18.5 percent from the 1990 census. This increase in the population 85 years and over is the result of improvements in life expectancy at advanced ages, high levels of birth during the first decade of this century, and very high immigration from Europe during the early part of the century. With the oldest old population growing rapidly, the number of deaths in the Nation will continue to rise annually unless medical advances bring about a dramatic increase in people's lifespans.

During 1994, the number of people of Hispanic origin[8] grew by 897,000 people (3.5 percent). At the same time, the number of white non-Hispanic population grew by 813,000 people. This marks the first year that annual growth in the Hispanic population became numerically larger than annual growth in the white, non-Hispanic population. During 1994, the Asian and

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[8] People of Hispanic origin may be of any "race." The information on the total and Hispanic population was collected in the 50 States and the District of Columbia. It does not include residents of Puerto Rico.

Pacific Islander population grew by 336,000 (3.8 percent); the Black[9] population grew by 484,000 (1.5 percent); the American Indian, Eskimo, and Aleut population grew by 33,000 (1.5 percent); and the white population grew by 1,618,000 (0.8 percent). The Asian and Pacific Islander population is the only population where net international migration (201,000) added more people than natural increase (134,000).

Changes in the Western States

As in earlier periods, the population of the Western States[10] has been growing more quickly than predicted, both as a result of natural increase[11] and due to the movement of people into the West from other States and abroad. During the last 25 years, the population of the 17 Western States grew by about 32 percent as a whole, in comparison with a growth rate of 19 percent for the rest of the Nation. During just the last 15 years, the population of the West has grown by about 18 percent, in comparison to 11 percent for the rest of the Nation.

The overall growth of the Western population and the individual sources of that growth are impressive, but the most substantial and significant feature of demographic change in the West has to do with the way in which people have began to rearrange themselves on the Western landscape. Four maps in plate 6 provide a closeup view of the nature of some of these population changes.

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[9] The terms "Black," "Asian-Pacific Islander," American Indian," and so forth, along with the term "race," are terms of reference used in the last several decadal censuses. The Census Bureau currently is considering changes to this terminology. We will follow the convention established by the Census Bureau in earlier times here in order to accurately represent the numerical descriptions of various ethnic components of the population in these censuses.

[10] This analysis will differ from similar ones published by the Bureau of the Census due to differences in our definitions of "the West." Since 1910, the Census Bureau has defined "the West" to include only the States of Alaska, Hawaii, Washington, Oregon, California, Idaho, Utah, Nevada, Arizona, Montana, Wyoming, Colorado, and New Mexico. Texas and Oklahoma are considered to be part of "the South"; while the Dakotas, Nebraska, and Kansas are considered to be part of "the Midwest." All the descriptions presented in this report make use of the original Census Bureau data, but compile and analyze it in terms of the 17 Western States shown throughout this document.

[11] "Natural increase" is considered to be the difference between births and deaths in the existing population.

The first map in this plate displays the amount of population change taking place between 1960 and 1970. This map is intended to provide a visual baseline or point of reference for the following discussion. It shows changes resulting from natural increase and from the continued migration of people in the Eastern and Great Plains States to Western coastal cities. Steady migration of this form had been taking place since 1945. Some of the interior Western cities—Albuquerque, Denver, Salt Lake City, and Spokane—were beginning to enlarge, both as a result of the natural increase of their citizens and as a result of receiving migrants from surrounding rural areas and the larger metropolitan areas of the coast.

In the 1970s, a more dramatic picture took form. Large numbers of people moved to the interior West from the Western coastal cities. At the same time, the interior West also received immigrants from the Northern Great Plains States, the Lake States, the Eastern Coastal States, and the South. West Coast cities continued to grow, but their populations were of such magnitude that continued growth here did not constitute significant change. This was not true for the interior States. Arizona, New Mexico, and southern Nevada received particularly large influxes of people from the Eastern seaboard, the Lake States, and the Midwest. All the interior States, almost every county, received new people in numbers that, for them, represented substantial increases over their historical populations. For a time, even the emptying out of the Northern Great Plains was arrested on its westernmost marches.

Then, in the 1980s (actually in just the last part of the 1970s and extending into the 1990s), the pattern of relatively even dispersal into the interior changed direction. Very slowly at first, and then at an increasing rate during the 1980s, migrants began to collect in a small nucleus of inland cities and metropolitan areas. The emptying out of the Northern Great Plains resumed its long historical trajectory. It now began to reach down into Oklahoma and northern Texas. Small towns and rural areas throughout the interior West lost people to these new cities. A small number of nuclear cities in the interior West started to acquire a velocity of growth substantially different than that of the rural areas or the older metropolitan areas of the coast.

In western areas outside of Southern California, a series of urban archipelagos began to take form. These were, and are today, areas of very high population density, surrounded by large rural areas whose populations are sparse and declining. Each of these areas consists of a number of central

The first map in this plate displays the amount of population change taking place between 1920 and 1970. This map is intended to provide a visual baseline or point of reference for the following discussion. It shows changes resulting from natural increase and from the continued migration of people in the Eastern and Great Plains States to Western coastal cities. Steady intensification of this trend had been taking place since 1945. Some of the interior Western cities—Albuquerque, Denver, Salt Lake City, and Spokane—were beginning to emerge, at least as a result of the natural increase of their citizens and as a result of receiving migrants from surrounding rural areas and the largest metropolitan areas of the coast.

In the 1970s, a more dramatic picture took form. Large numbers of people moved to the interior West from the Western coastal cities. At the same time, the interior West also received immigrants from the Northern Great Plains States, the Lake States, the Eastern Central States, and the South. West Coastal States continued to grow, but their populations were of such magnitude that significant growth here did not constitute significant change. This was not so with the interior States. Arizona, New Mexico, and southern Nevada, for example, absorbed large influxes of people from the Eastern seaboard, the Lake States, and the Midwest. All the interior States, whose [illegible], absorbed new people in numbers that, for them, represented [illegible] increases over their historical populations. For a time, even the emptying out of the Northern Great Plains was arrested on its westernmost margins.

Then, in the 1980s (actually in just the first part of the 1970s and extending into the 1980s), the pattern of relatively even dispersal into the interior [illegible]. Very slowly at first, and then at an increasing rate during the 1980s, emptiness began, in effect, in a small number of inland cities and metropolitan areas. The emptying out of the Northern Great Plains resumed [illegible], it now began to reach down into Oklahoma and northern Texas. Rural decline was [illegible] across the whole of the interior West [illegible] Wyoming, Colorado, and Idaho. A small number of regional cities in the [illegible] show a capacity of growth substantially different from that of rural areas or the older metropolitan areas of the coast.

In [illegible], a series of urban [illegible] began to take form. These were, and are today, islands of very high population density surrounded by large rural areas whose populations are aged and declining. Each of these areas consists of a number of central

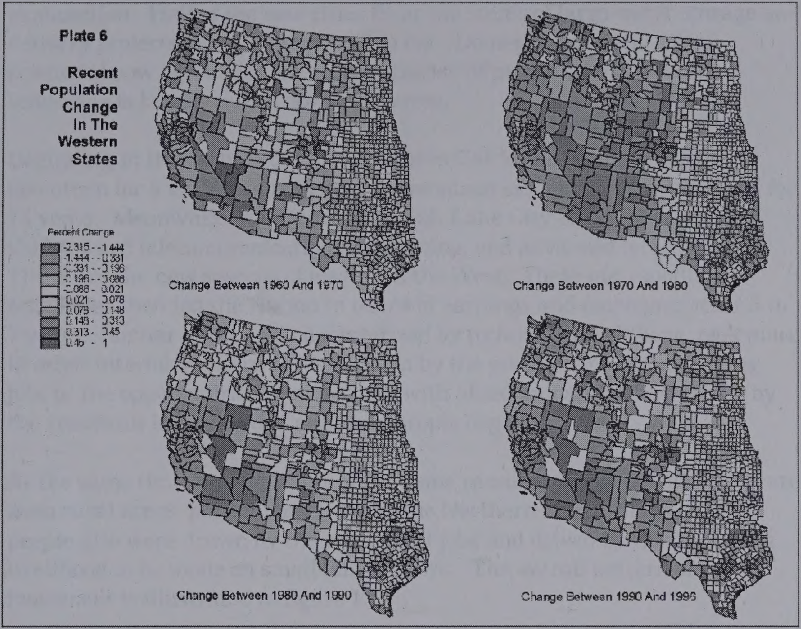

Plate 6

Recent Population Change In The Western States

Percent Change
-2.315 - -1.444
-1.444 - -0.331
-0.331 - -0.196
-0.196 - -0.088
-0.088 - 0.021
0.021 - 0.078
0.078 - 0.148
0.148 - 0.313
0.313 - 0.45
0.45 - 1
Change Between 1960 And 1970
Change Between 1970 And 1980
Change Between 1980 And 1990
Change Between 1990 And 1995

cities, typical of a metropolitan area, and a ring of suburbs. Some of the suburbs are extensive and exist on land formerly considered to be uninhabitable by large numbers of people. These include marsh lands and deltas in the Coastal States and foothills and steep mountainous areas in the interior States.

We now know that this pattern of concentration of most of the West's people into what appears to be a relatively small number of metropolitan areas began in the latter 1970s. But its outlines did not become clear until the mid-1990s.

Some of these urban archipelagos are in places which would have surprised people in the 1970s. Boise, Salt Lake City, Spokane, Denver, Las Vegas, Sacramento, Eugene, El Paso, Dallas, Houston, Albuquerque, Tucson, Phoenix, and Missoula are included in the roster of "new cities" of the West.

All the new cities are located on nodes of the interstate highway system, but the structure of the transportation network does not appear to explain their creation or continued growth. The structure of large-scale water developments created in the West during the last 25 years also provides little

explanation. Half of the new cities lie at the stems of large water storage and delivery projects, but the other half do not. Demographers and social scientists now agree that the reorganization of people on the Western landscape is largely due to economic forces.

Beginning in the early 1980s, the Southern California economy took a downturn for a variety of reasons and remained essentially at a standstill for 14 years. Meanwhile, the Denver and Salt Lake City economies began to shift toward telecommunications, computing, and advanced technologies. These are the new sources of wealth in the West. These metropolitan economies then led the Nation in terms of earnings and employment for 5 to 7 years. Similar events, all characterized by technological shifting, took place in other interior Western cities. Drawn by the prospects of higher-paying jobs or the opportunities of co-locating with allied industries, and driven by the standstill in Southern California, people began to move.

At the same time, and for many of the same reasons, people began to migrate from rural areas, particularly those of the Northern Great Plains. These people also were drawn by the prospect of jobs and driven by the dwindling livelihood to be made on small family farms. The overall pattern of movement is illustrated in figure 1.

Southern California continued to grow tremendously, but an increasingly large fraction of its growth took its source in immigration. For people emigrating from the Far East and from Latin America, the Southern California economy was, and still is, rich in opportunity. But for people having sufficient income to acquire discretionary funds, the Southern California economy was proving to be a relatively poor place in which to invest those funds. This was true not only for those who would normally invest funds in conventional ways, but for millions of ordinary people who wished to purchase real property, such as homes, or for those seeking to invest in such things as higher education for their children. Between 1994 and 1995, California acquired 370,000 immigrants, but exported 480,460 people to coastal cities further north or to the interior West. Colorado, the State with the highest rate of economic growth in the Nation in that year, received approximately one-third of its new citizens from California.

Economic Change

Changes in demography and the economy are closely intertwined. By 1977, the Western economy, with the possible exception of mining, was much more urban and industrial than was commonly supposed. Table 1 displays the total net earnings of different sectors of the economy in that year.[12]

Figure 2 displays this same information in graphical form. In this figure, the 20 industrial sectors are arrayed along a continuum representing typical developmental stages of an economy (primary, secondary, tertiary, etc.) according to conventional theory.[13] The figure shows that the service and trade industries were the dominant Western economic sectors in 1977, as they were for the United States as a whole. The services sector is a very complex and constantly evolving sector. It includes a wide variety of enterprises such as professional services (engineering, medicine, and architecture), service industries necessary to other types of industrial sectors (such as real estate, advertising, and document reproduction), and firms which typically rely on relatively unskilled labor.

For purposes of this analysis, we placed services catering exclusively to individuals (such as hair dressers, restaurants and motels, amusement parks, theaters, and gambling places) in their own category ("consumer services') so that we might trace the separate growth in the West of industries consuming discretionary dollars. Note that the consumer services industrial sector also accounts for a large share of Western economic activity in 1977.

In 1977, the next largest industrial sectors (in terms of economic activity) were consumer services, construction, and all the industries which fabricate materials (metal, glass, plastic, woven fabrics, rubber, and so forth).

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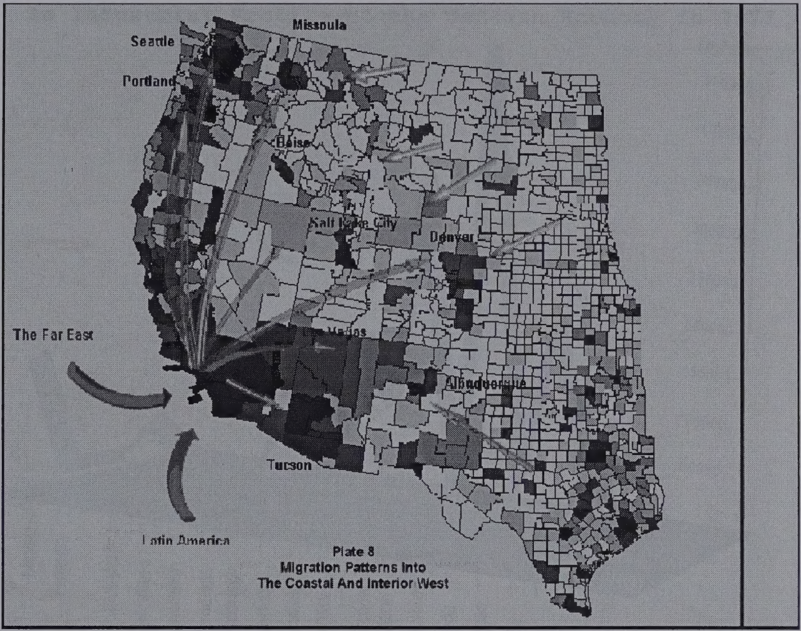
[12] These figures represent the sum of net incomes received by all firms operating in these industrial groupings in the West in 1977. The raw data for these figures were originally acquired by the Bureau of Economic Analysis, Department of Commerce, and then developed into computations of net earnings, employment, and contribution to the gross domestic national product through the IMPLAN Program. The IMPLAN Program was developed by Dr. Alward as a U.S. Department of Agriculture, Forest Service project and is now maintained and published by MIG Inc., Stillwater, Minnesota.

[13] Few regional economies actually are allowed to develop along these idealized lines. Most are influenced by the economies around them (especially if the development of those external economies predates these), and by ties to the international marketplace. This way of portraying the Western regional economy, and recent changes in it, is provided purely for purposes of illustration.

Figure 1
Recent Patterns of Demographic Movement in the West

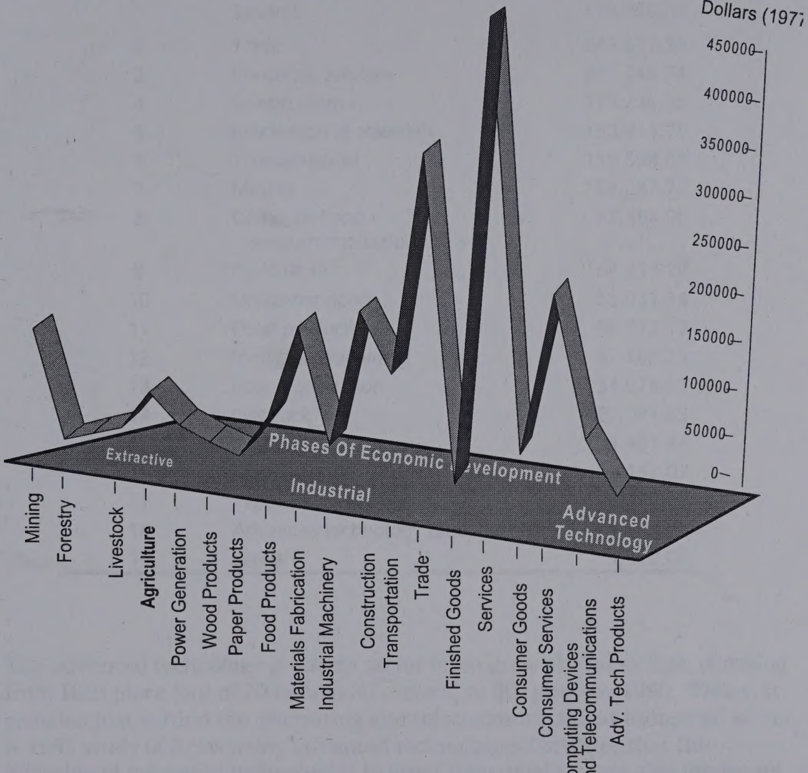

Missoula
Seattle
Portland
Boise
Salt Lake City
Denver
The Far East
Las Vegas
Albuquerque
Tucson
Latin America
Plate 8
Migration Patterns Into
The Coastal And Interior West

Agriculture, the largest water-using industry, ranked ninth in terms of earning capacity in the Western economy.

Not surprisingly, the locations of the economically dominant industries are distributed among the Western counties in much the same fashion as is the population. (See plate 7.) Agriculture, mining, livestock ranching, and the other extractive industries tend to be located in places where these resources occur in the landscape, of course. (See the maps in plate 8.)

To some extent, these tend to be rural locations, but not exclusively. As the map of agricultural economic activity in plate 9 indicates, some of the centers of supposedly rural activities, such as agriculture, actually tend to be located in counties very near the most densely populated counties, particularly those along the coast and those situated at the nodes of the interstate highway system in the Western interior. In fact, agricultural activity nearest the metropolitan centers of the West tends to generate the highest earnings. But this is less true for mining, livestock ranching, fishing, and forestry.

Figure 2
An Industrial Profile of the Western Economy in 1977



Over the last 25 years, the Western economy has grown and changed as indicated in figure 3[14] and table 2. Overall, the proportional distribution of economic activity across sectors remains relatively stable. All sectors of the economy have grown in terms of earnings and employment.

The service sector has continued to dominate the economy. It not only is the largest sector, but it has expanded more rapidly than all the others.

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[14] Tabular information for figure 3 is placed on the page immediately following the figure.

Table 1.—1977 dollar earnings by all industries organized into 19 industrial sectors[15]

Rank	Industrial sector	Earnings
1	Services	479,456.03
2	Trade	343,677.35
3	Consumer services	222,145.74
4	Construction	179,236.25
5	Fabrication of materials	153,811.79
6	Transportation	119,599.02
7	Mining	114,287.72
8	Computers and telecommunications	82,484.00
9	Agriculture	64,217.22
10	Consumer goods	58,031.54
11	Food products	56,273.17
12	Industrial machinery	37,161.23
13	Power generation	34,974.51
14	Livestock	23,021.63
15	Wood products	21,453.44
16	Finished goods	19,152.07
17	Paper and paper products	11,857.42
18	Advanced technology products	1,680.78
19	Forestry	1,372.08

The advanced technology products sector often grew almost as fast, climbing from 18th place (out of 20 industrial sectors) to 8th place by 1990. Today, it remains just behind the computing and telecommunications industrial sector. A 1993 study of firms using advanced technologies indicates that the diffusion of advanced technologies to other industrial sectors also increased the earnings (and wages) generated by firms adopting these technologies.[16] If the advanced technology products firms and the computing and telecommuni-cations sectors are taken together (given the merging evolution

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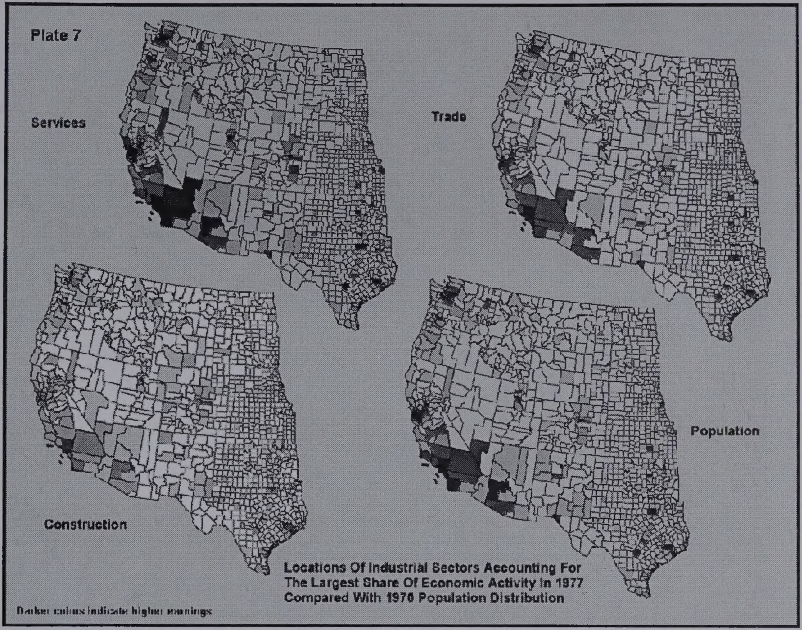
[15] The value of dollars shown in this table is inflated to be equivalent to the worth of dollars in 1993. All economic earnings data presented in this section of the report (with the exception of table 3) are inflated to the common base year of 1993 so that they can be accurately compared with each other.

[16] "Higher Wages Accompany Advanced Technology" by Timothy Dunne, University of Oklahoma, and Kathy V. Friedman, Economic Statistical Briefs, U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, August 1993.

Plate 7

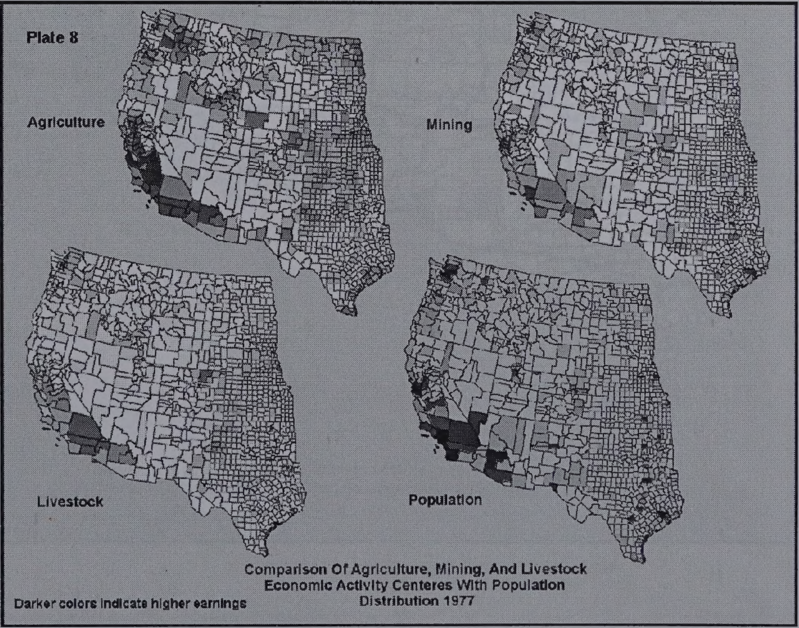

Services
Trade
Population
Construction

Locations Of Industrial Sectors Accounting For The Largest Share Of Economic Activity In 1977 Compared With 1970 Population Distribution

Darker colours indicate higher earnings

of these two industrial sectors), their combined rate of growth would exceed the growth rate of the services industry.

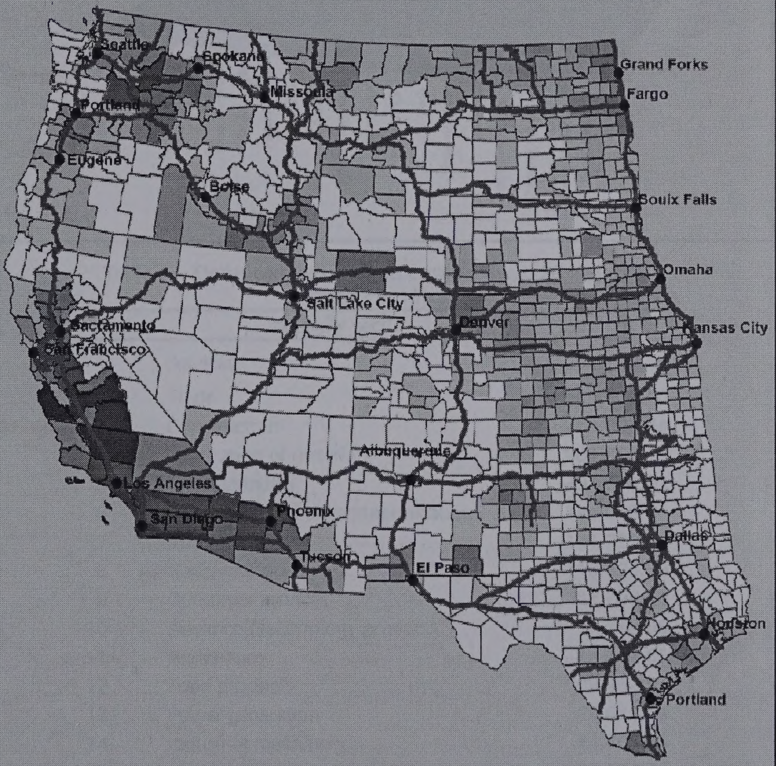
Plate 8


Agriculture
Mining
Livestock
Population

Comparison Of Agriculture, Mining, And Livestock
Economic Activity Centeres With Population
Distribution 1977

Darker colors indicate higher earnings

Plate 9


Seattle
Spokane
Missoula
Portland
Eugene
Boise
Grand Forks
Fargo
Sioux Falls
Omaha
Salt Lake City
Denver
Kansas City
Sacramento
San Francisco
Albuquerque
Los Angeles
San Diego
Phoenix
Tucson
El Paso
Dallas
Houston
Portland

Distribution Of Agricultural Economic Activity In 1977
In Relation To Major Cities And The Interstate Highway System

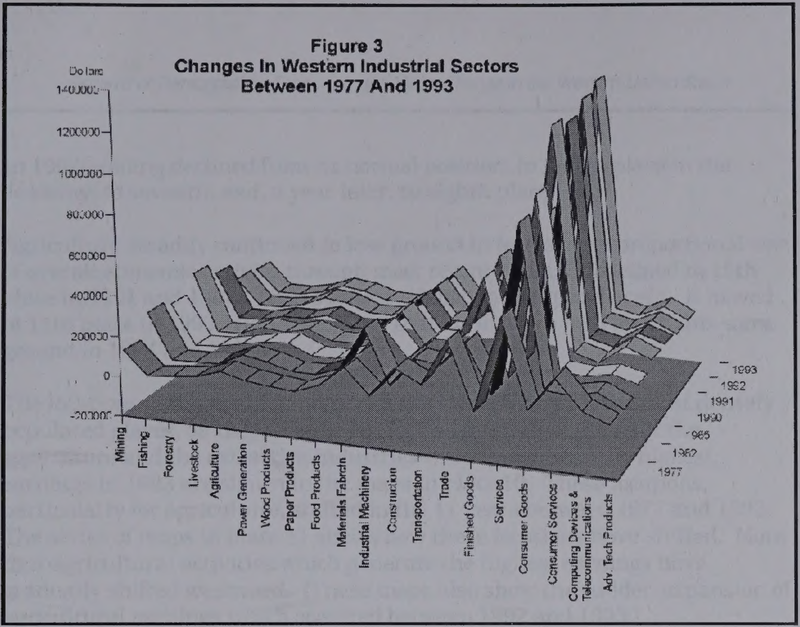


Figure 3
Changes In Western Industrial Sectors Between 1977 And 1993

Table 2.—Dollar earnings by firms organized into 20 industrial sectors in 1993

Rank	Industrial sector	Earnings
1	Services	1,292,740.53
2	Trade	569,806.40
3	Construction	268,095.74
4	Fabrication of materials	201,461.19
5	Transportation	193,078.02
6	Computers and telecommunications	142,018.01
7	Mining	121,223.73
8	Consumer goods	110,638.76
9	Consumer services	81,298.66
10	Advanced technology products	77,748.96
11	Agriculture	74,164.85
12	Food products	69,460.94
13	Power generation	58,078.74
14	Industrial machinery	44,406.64
15	Livestock	27,531.04
16	Finished goods	22,740.99
17	Wood products	22,086.88
18	Paper and paper products	17,912.32
19	Forestry	5,774.20
20	Fishing[17]	3,117.42

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[17] Fishing was not considered to be an industrial sector until 1978. No earnings information exists for fishing prior to this time. Our table for 1977 excludes fishing and contains 19 sectors. The remainder of our analysis treats fishing as a separate sector and includes it to make up 20 sectors.

In 1992, mining declined from its normal position, in fourth place in the economy, to seventh; and, a year later, to eighth place.

Agriculture steadily continued to lose ground in terms of its proportional size of overall economic activity through most recent years. It declined to 15th place in 1991 and 1992. Then suddenly, it began to expand again: it moved to 11th place in 1993. Indications are that agriculture held about this same ground in 1994 and 1995.

The locations of the leading industries are coincident with the most densely populated places, as they were in 1977. The relative locations of the agriculture and the extractive industries which generated the highest earnings in 1993 are shown in the maps in plate 10. These locations, particularly for agriculture, shifted in the 17 years between 1977 and 1993. The series of maps in plate 11 shows how these locations have shifted. Note that agricultural activities which generate the highest earnings have gradually shifted westward. (These maps also show the sudden expansion of agricultural earnings which occurred between 1992 and 1993.)

Agriculture has changed in some other important ways as well. According to the 1992 Census of Agriculture, the number of large farms and ranches (those with sales of $100,000 or more)[18] has increased rapidly in the last 25 years. Where there was one large farm or ranch in 1969, there were six in 1992. While total farm and ranch counts have dwindled from 2.7 million in 1969 to 1.9 million in 1992, the number of large farms and ranches has jumped from 51,995 in 1969 to 333,865 in 1992. Large farms and ranches, and farms and ranches with less than $100,000 in sales, provide two distinctly different profiles.

Based on the 1992 Census of Agriculture data, large farms and ranches are much greater in size and produce more products than smaller farms and ranches (see table 3). They account for the majority of assets. Large farms and ranches also are more likely to be operated by full-time farmers and ranchers, receive most of the government payments, are more likely to be corporations, and generate far greater returns.

Many large farms and ranches are not just relatively large economically, but also are large in acreage terms. Though large farms and ranches in 1992 comprised less than 20 percent of all such operations in the United States, they operated 54 percent of the total land in agriculture and produced approximately 83 percent of all farm and ranch products sold. Large farms

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[18] The sum of $100,000 is expressed in terms of the value of dollars in 1992. All dollar figures described in this discussion of large and small farms and ranches are expressed in terms of the value of dollars in 1992.

and ranches averaged 1,542 acres in size compared to 271 acres for smaller operations.

Most of the Nation's farm and ranch products came from large farms and ranches which accounted for the majority of the value of agricultural products sold. Large farms dominated poultry and poultry products, accounting for 98 percent of these sales in 1992.

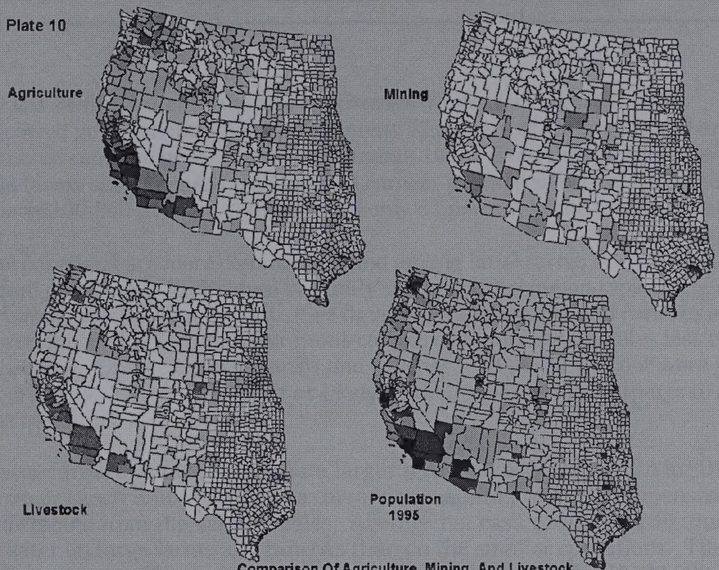
Table 3.—Comparison of the average value of selected items for farms and ranches with sales greater and less than $100,000
(All values are expressed in 1992 dollars unless otherwise stated)

Item	$100,000 or more	Less than $100,000
Land in farms and ranches (acres)	1,542	271
Value of land and buildings	$1,059,510	$212,816
Value of machinery and equipment	$150,852	$27,547
Value of sales	$402,081	$17,825
Grains	$125,806	$19,873
Vegetables, sweet corn, and melons	$332,264	$10,631
Fruits, nuts, and berries	$441,001	$15,329
Nursery and greenhouse crops	$611,477	$18,105
Poultry and poultry products	$544,452	$7,549
Dairy products	$221,848	$40,646
Cattle and calves	$182,583	$9,917
Hogs and pigs	$133,219	$13,329
Government payments	$17,171	$5,080
Average net cash returns	$83,812	$1,836

Large farms and ranches tend to hold large assets. In 1992, they accounted for more than half the total value of machinery and equipment and total value of land and buildings on farms and ranches. For these operations, the average value of machinery and equipment was $150,852. The average value for land and buildings was $1,059,510. These average values were approximately five times greater for large farms and ranches than for their smaller counterparts.

Managing a large farm or ranch is a full-time job for most operators. Over 90 percent of large farm or ranch operators considered farming or ranching to be their principal occupation, compared to 47 percent of the small operators. In the 1992 Census of Agriculture, only 24 percent of the large operators reported any off-farm work compared to the 57 percent reported by the smaller operators.

Plate 10


Agriculture
Mining
Livestock
Population
1995

Comparison Of Agriculture, Mining, And Livestock Economic Activity Centers With Population Distribution 1995

Spatial Changes In Agricultural Economic Activity Over Time

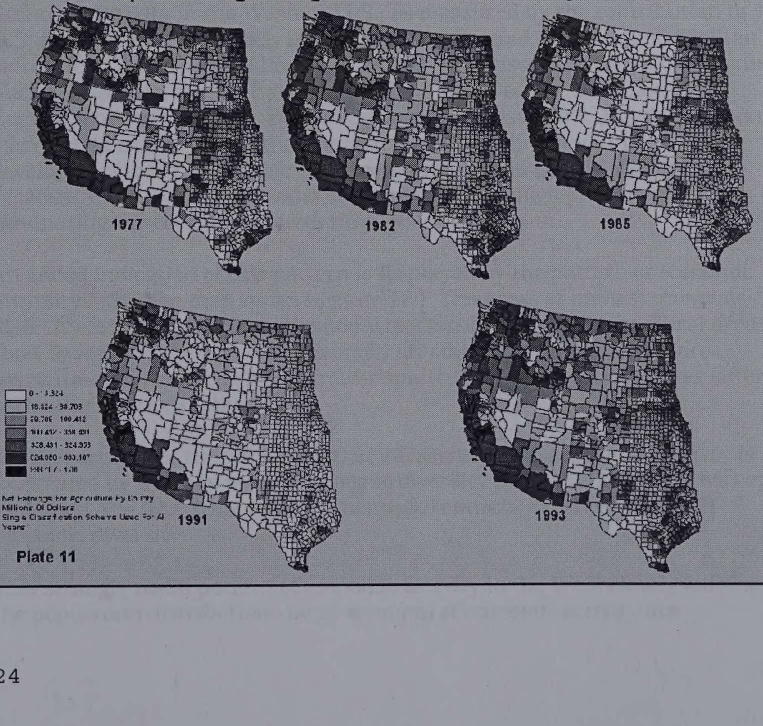

1977
1982
1985
1991
1993
0 - 18.324
18.324 - 38.703
Net Earnings For Agriculture By County
Millions Of Dollars
Single Classification Scheme Used For All Years

Plate 11

About 24 percent of farms and ranches with sales less than $100,000 received government payments, whereas 57 percent of all large farms and ranches received government payments in 1992. Even though 66 percent of the farms and ranches receiving government payments in 1992 reported less than $100,000 in sales, they received only 37 percent of the total payments.

Corporations are more commonly found among large farms and ranches than small ones, while "individual or family" is the most common type of organization for both groups. (See figure 4.) Large farms and ranches are six times more likely to be corporations compared to farms with sales less than $100,000. Of all corporate farms and ranches in 1992, 57 percent were large operations. These were twice as likely as their smaller counterparts to be partnerships.

Large farms and ranches produce larger returns. Net cash return for the farm or ranch unit is defined as current noncapital production expenses subtracted from the value of sales. Average net cash return was 46 times greater on large farms and ranches than on the smaller operations. The average net cash return for farms and ranches with less than $100,000 in sales was only $1,836 versus $83,812 for the large operations, excluding government payments.

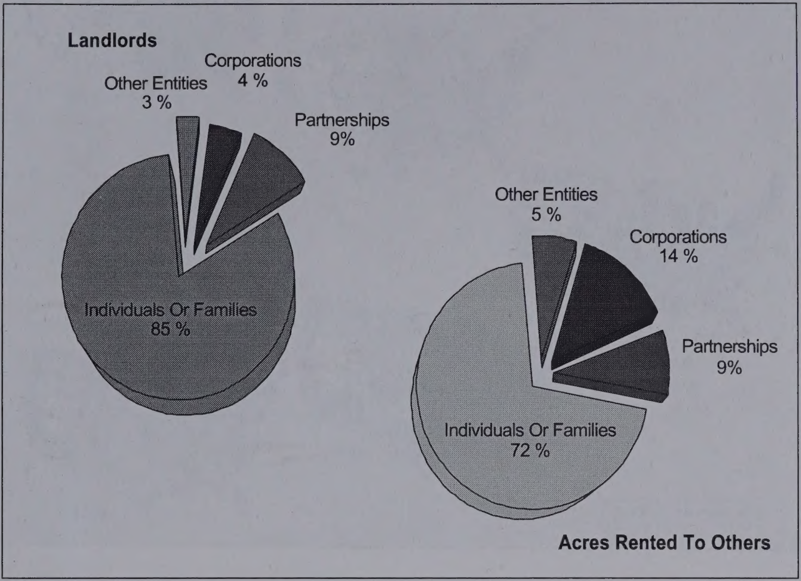
Economic activity in the Western U.S., as measured by the contribution to U.S. gross domestic product, is strongly concentrated in nodal metropolitan economies. These include Los Angeles, San Francisco, Sacramento, Phoenix, Tucson, Albuquerque, El Paso, Dallas, Houston, Denver, Salt Lake City, Eugene, Portland, Seattle, Boise, Spokane, and Missoula. This strong nodal pattern has characterized the Western landscape throughout its development, but has become even more pronounced during the past two decades. Over time, these nodal economies have gained prominence, dominating the economic growth throughout the region.

An added indication of this pattern is displayed by the pattern of economic diversity. (See the map series in plate 12.) The areas of highest economic diversity are predominantly the nodal metropolitan economies. Rural areas show lower levels of economic diversity or, stated conversely, are more specialized and depend on a narrower spectrum of economic activities (often agricultural or extractive uses).

The importance of the transportation infrastructure to economic activity is illustrated by the map of U.S. economic diversity in plate 13. Almost without exception, the interstate highway network connects counties with high economic diversity.

This strongly nodal pattern of economic activity in the West closely follows the population distribution: large amounts of economic activity are

Figure 4
Landlords Are Individuals And Families



coincident with the highest concentrations of people. Our data indicate that economic patterns change more slowly than do demographic patterns and population change, but the economic patterns still appear to follow and, in some cases, to shape the patterns of demographic change. (Both "cause" and "effect" processes seem to be taking place between economy and demography. These data sets do not allow us to isolate or trace these interactions clearly, but we can see that they do occur.)

In contrast, water use follows a very different pattern, quite unlike the patterns of economic activity. (See plate 14.) Even if only the economic uses of water are considered (total water use less domestic and power generation uses), the dissimilarity between the two patterns increases. (See plate 15.) In other words, the pattern of economic activity in the West is very different from the pattern of water use in the region. The obvious reason is that, in general, agriculture utilizes the most water. Since agriculture is typically located outside of the metropolitan economic nodes (with the great exception of Los Angeles County), the pattern of water use is strikingly different than the economic pattern. While total economic activity is strongly concentrated in metropolitan nodes, the economic uses of water are far more dispersed. In fact, the pattern of economic uses of water shows clear associations with large-scale water supply and delivery systems such as the Columbia/Snake, Missouri/Platte, Rio Grande, Arkansas, and Colorado river systems, the Ogalla aquifer, and the Central Valley of California.

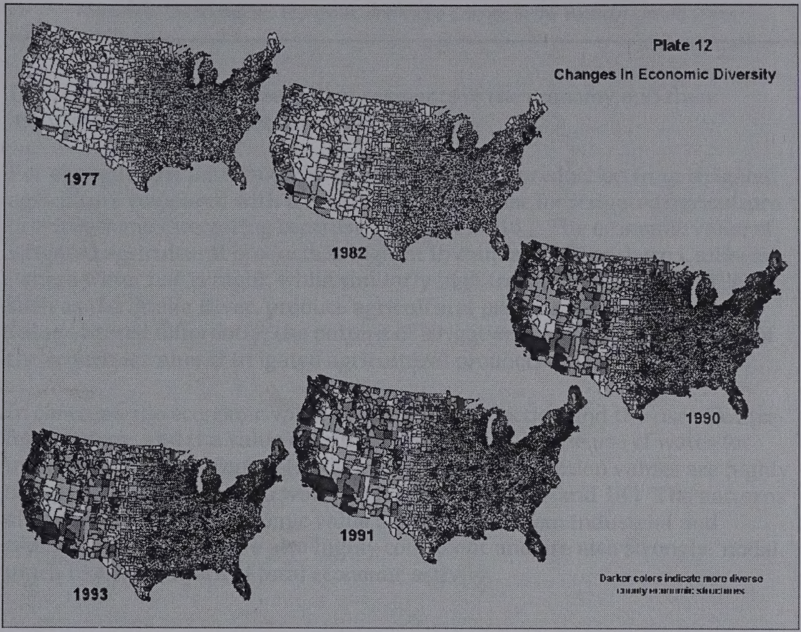


Plate 12

Changes In Economic Diversity

1977
1982
1990
1991
1993
Darker colors indicate more diverse county economic structures

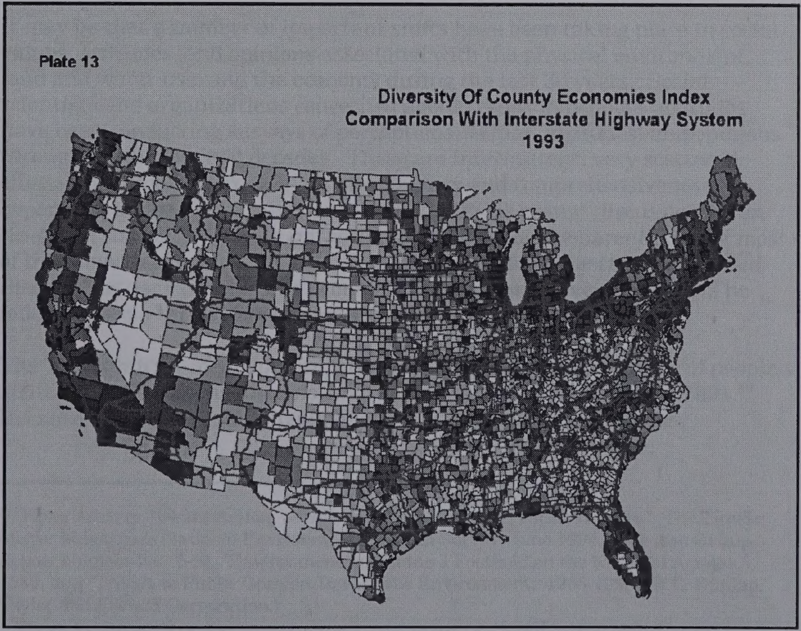


Plate 13

Diversity Of County Economies Index Comparison With Interstate Highway System 1993

Interesting patterns appear when segments of the economy and their associated water uses are examined.

For example, the pattern of the economic value of production from irrigated agriculture compared with the pattern of water use for irrigated agriculture provides some interesting contrasts. (See plate 16.) The economic value of irrigated agricultural products is highest in central and Southern California (where water use is high), while similarly high irrigation water use areas, such as the Snake River, produce agricultural products of lower economic value. Stated differently, the pattern of irrigation is not a good predictor of the economic value of irrigated agricultural products in the West.

In contrast, the economic value of livestock production and the use of water for livestock, and the value of mining production and the use of water for mining both show strong coincidence: economic production values are highly correlated with associated water uses. (See plates 17 and 18.) The patterns of water use for and economic value of production from industrial and commercial activities are also highly coincident and are also strongly "nodal," much like the pattern of total economic activity.

Social Perceptions and Values

It may be that a number of important shifts have been taking place in social values, attitudes, and opinions associated with the physical environment, land and water use, and the economy during the last 30 years. Social scientists and organizations concerned about trends in people's attitudes have been conducting surveys of perceptions, values, attitudes, and opinions throughout the last two decades. These are intermittent, very scattered efforts, and have different levels of reliability and comprehensiveness, depending upon whether they are a "poll," a "focus group" discussion, or an "in-depth survey." We have gathered the results (or the parent data) of most of the important and reliable studies relevant to this subject and have tied these to our demographic and economic data sets wherever possible. The following are a series of representative findings from these data.

The Times-Mirror media organization conducted an annual survey of people's attitudes and opinions towards environmental issues beginning in 1991.[19] Because these are annual "polls" made by the very reputable Roper

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[19] "From Anxiety Toward Action: A Status Report On Conservation In 1994." The Times-Mirror Magazine's National Environmental Forum Survey, June 1994. (See also Gallup Report Number 285:2-12, "Environment Regaining a Foothold on the National Agenda," 1989, and "Trends in Public Opinion Toward the Environment: 1965-1990," R.E. Dunlap, Taylor and Francis Corporation.)

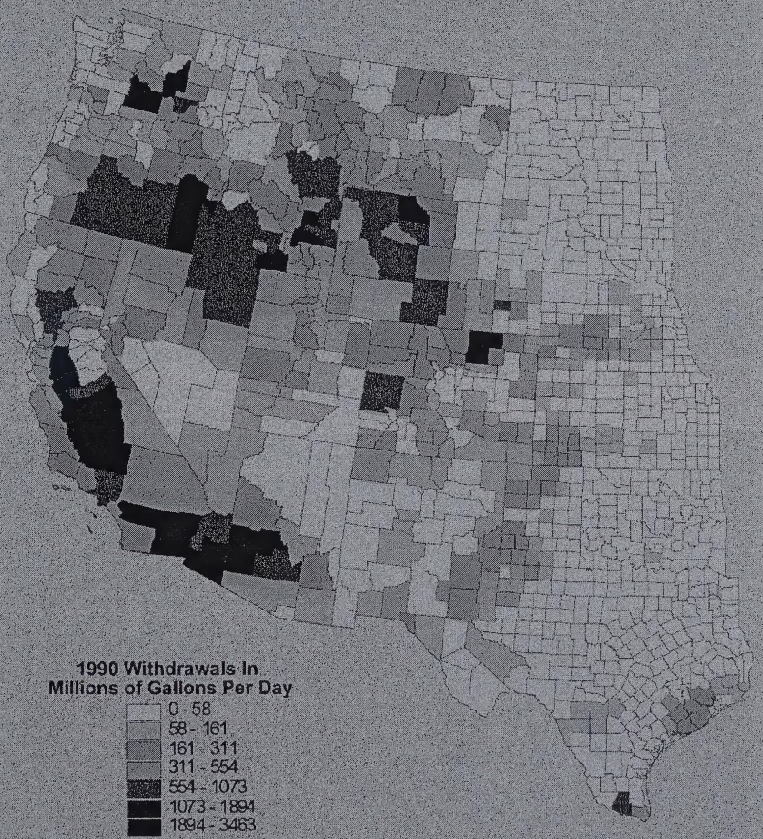
surveying organization (and they include a little more than 1,000 respondents each, well distributed across the U.S.), they provide a reasonably systematic view of people's attitudes toward issues relevant to Western water policy matters.

In general, the Times-Mirror polls indicated that:

- Americans are very concerned about the environment.
- Interest remains high over the years.
- Americans are optimistic that environmental problems can be solved.
- We want environmental problems addressed NOW.
- Americans are in favor of conservation, not preservation or radical reform.
- Water issues are paramount.

These findings are illustrated in more detail in plates 19 through 21.

Plate 14
Total Economic Water Use Excluding Power Generation
1990


1990 Withdrawals In
Millions of Gallons Per Day
0 - 58
58 - 161
161 - 311
311 - 554
554 - 1073
1073 - 1894
1894 - 3463

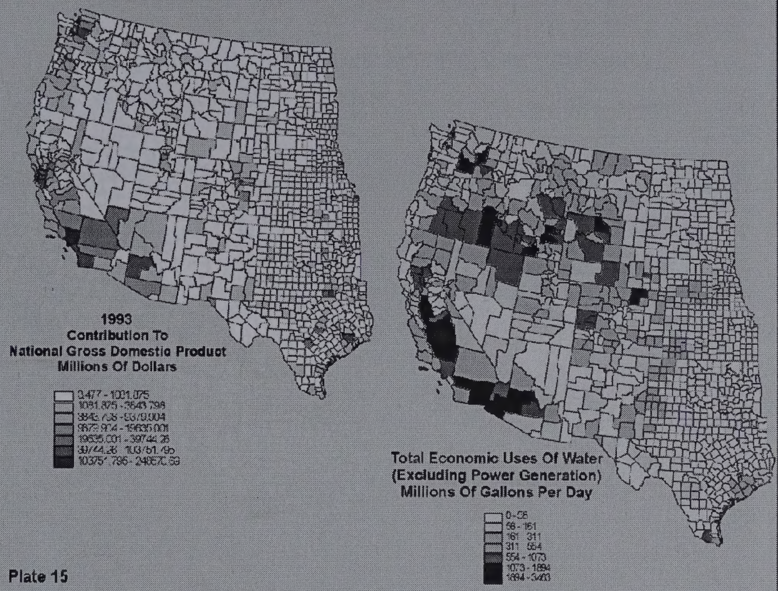
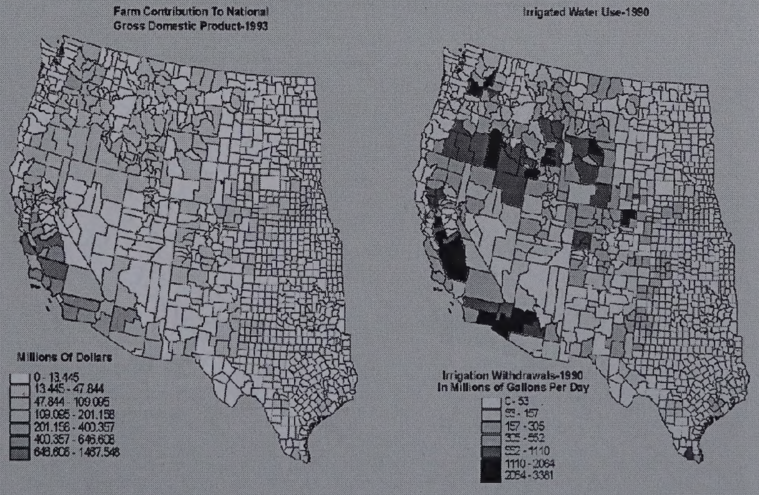

1993
Contribution To
National Gross Domestic Product
Millions Of Dollars
0.477 - 1081.875
1081.875 - 3843.798
3843.798 - 9879.904
9879.904 - 19635.001
19635.001 - 39744.26
39744.26 - 103751.796
103751.796 - 248570.59
Total Economic Uses Of Water
(Excluding Power Generation)
Millions Of Gallons Per Day
0 - 58
58 - 161
161 - 311
311 - 554
554 - 1073
1073 - 1894
1894 - 3463

Plate 15

Plate 16
Farm Production And Irrigation Withdrawals

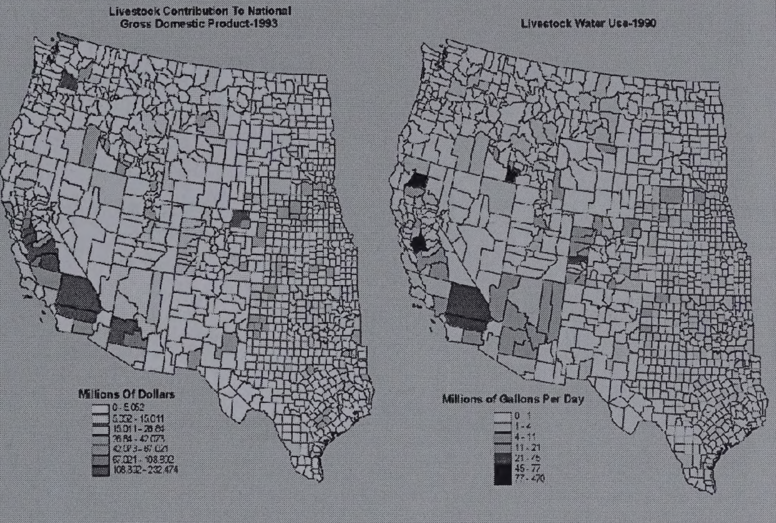

Farm Contribution To National Gross Domestic Product-1993

Irrigated Water Use-1990

Millions Of Dollars
0 - 13.445
13.445 - 47.844
47.844 - 109.095
109.095 - 201.158
201.158 - 400.357
400.357 - 646.608
646.608 - 1467.548
Irrigation Withdrawals-1990
In Millions of Gallons Per Day
0 - 53
53 - 157
157 - 305
305 - 552
552 - 1110
1110 - 2064
2064 - 3381

Plate 17

Livestock Production And Associated Water Withdrawals



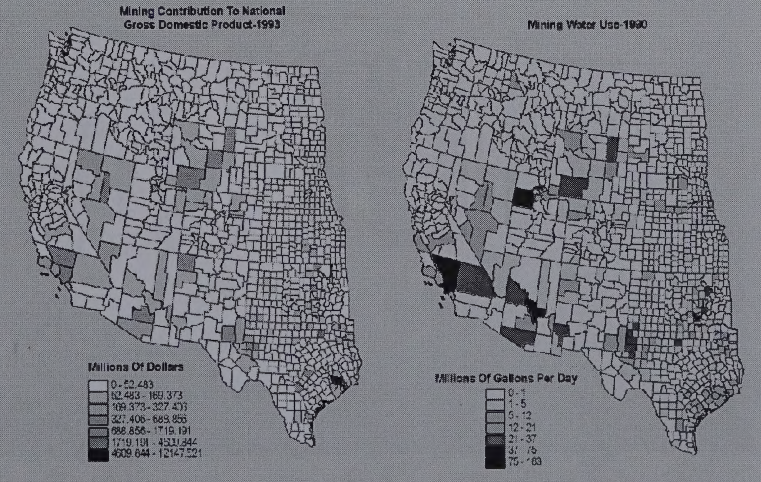
Livestock Contribution To National Gross Domestic Product-1993

Livestock Water Use-1990

Millions Of Dollars
0 - 5.052
5.052 - 15.011
15.011 - 28.84
28.84 - 42.073
42.073 - 67.021
67.021 - 108.332
108.332 - 232.474
Millions of Gallons Per Day
0 - 1
1 - 4
4 - 11
11 - 21
21 - 45
45 - 77
77 - 470

Plate 18

Mining And Associated Water Withdrawals



Mining Contribution To National Gross Domestic Product-1993

Mining Water Use-1990

Millions Of Dollars
0 - 52.483
52.483 - 169.373
169.373 - 327.406
327.406 - 688.856
688.856 - 1719.191
1719.191 - 4609.844
4609.844 - 12147.521
Millions Of Gallons Per Day
0 - 1
1 - 5
5 - 12
12 - 21
21 - 37
37 - 75
75 - 163

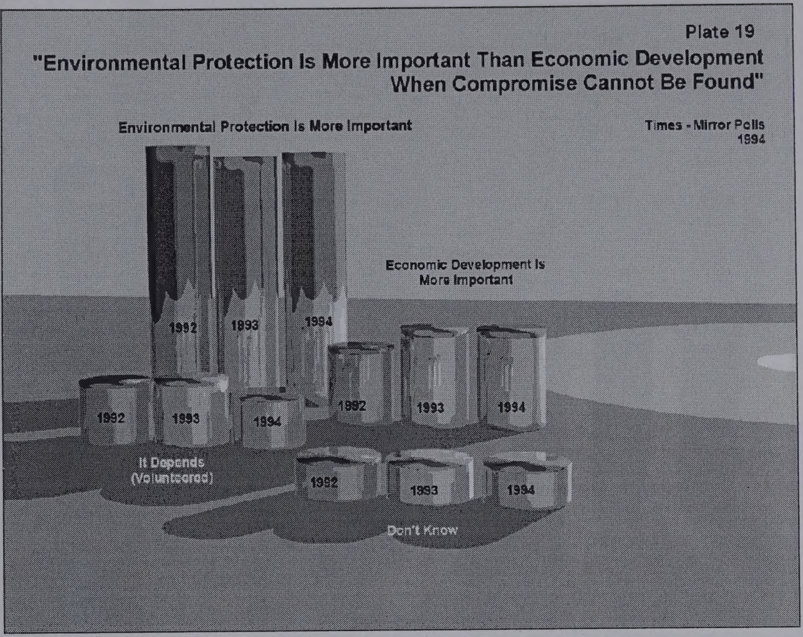


Plate 19

"Environmental Protection Is More Important Than Economic Development When Compromise Cannot Be Found"

Times - Mirror Polls
1994

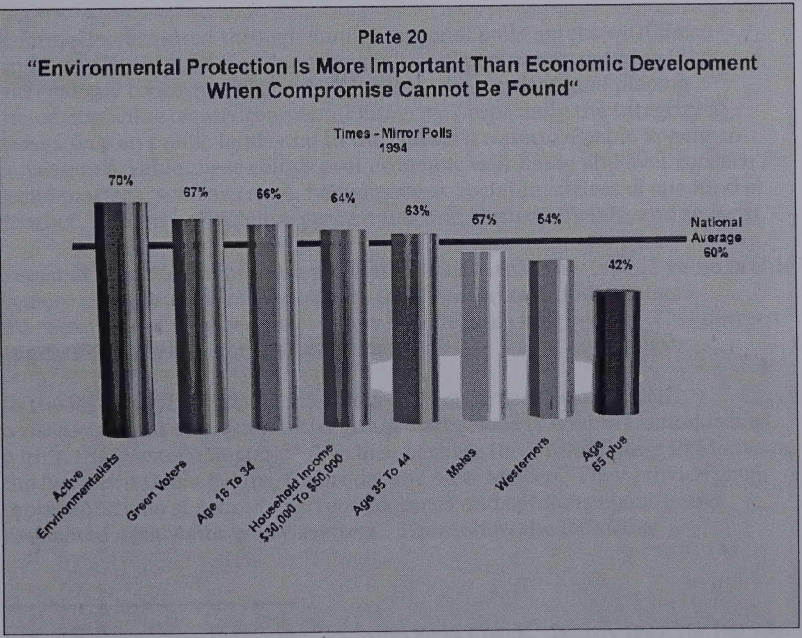


Plate 20

"Environmental Protection Is More Important Than Economic Development When Compromise Cannot Be Found"

Times - Mirror Polls
1994

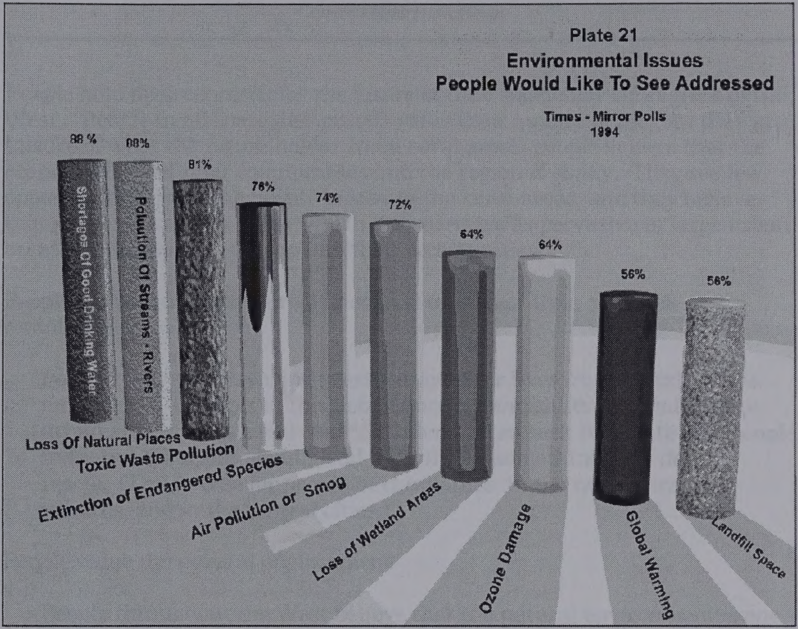


Plate 21
Environmental Issues
People Would Like To See Addressed

Times - Mirror Polls
1994

Information acquired through similar national polls agrees with these findings. These polls also describe a national population growing increasingly concerned about the physical environment, and placing increasing value on environmental integrity—especially the integrity of ecosystems on public lands and in the Nation's waters. People appear to consistently value these things over economic well-being and over concern for social matters, such as crime, homelessness, social injustices of one kind or another, integrity of public organizations and elected officials, and so forth.

Regional breakdowns of these poll data indicate that this type of value profile is more characteristic of Westerners than Easterners, and it is more characteristic of younger generations than it is of older people. This pattern appears to have held for the last decade.

In the last few years, social scientists have organized several well constructed and important focus group discussions of environmental issues within the Western Region.[20] The best of these have taken place in Montana, the Northern Great Plains, Colorado, and New Mexico. They provide good representations of people's current concerns and opinions about issues associated with water policy matters. These show the following:

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[20] Cf.,"The Great Plains Partnership Ecosystem Focus Groups," January 1995, The Harwood Group, and "Forest Resources Issue National Survey," March 23-27, 1994, American Pulp And Paper Association.

People hold deep concerns for the future of their particular subregions of the West.. People in all these discussions value their quality of life, but they are unsure of what the future holds. In all rural areas, people believe that the economic base of their communities and the region is shaky. They see few opportunities for young people to stay in the rural areas, and they believe that problems such as crime, which they perceive as pervasive in large urban areas, are beginning to creep into their communities.

People express a sense of eroding control over their lives and their communities.

> People describe increasing pressures on their lives from outside forces—for example, changes in the global economy and shifts in population to urban areas. People feel that "outsiders" often seek to dictate how people in these subregions should lead their lives—something they *deeply* resent. (This is true for people in rural areas, in the newly forming suburbs, and in the central cities.)

People value the natural environment.

> People throughout the West believe that the natural environment is one of the characteristics that makes the West unique—this is something they want to protect. People seem to equate a good environment primarily with clean air, clear water, and open spaces. (We should note that what constitutes "clean air," "open space," and so forth, depends very much on where the person is situated or recently "came from." A satisfactory level of "open space" to a person born in Colorado is very much different than the "open space" required by a person in Colorado who recently came from Southern California.)

People have an intuitive sense for how ecosystems work (although the word "ecosystem" resonates considerably more with suburban people and younger people than it does with long-time residents of the urban or rural West).

People's deepest concerns when it comes to ecosystem integrity are for their personal health.

> Water quality and its relationship to personal health is chief among these concerns.

People also emphasize the need to stay economically competitive.

People believe that problems with the environment emerge from a lack of knowledge and responsibility.

People believe the main cause of environmental abuse is lack of knowledge among landowners and large organizations.

For example, they say that large corporations or farmers undertake practices that they only later learn have negative consequences on, for instance, people's health. Most of the people in the focus groups insist that large corporations and landowners would not knowingly put their family, neighbors, and communities at risk. They believe that exceptions reported in the press are "exceptions" indeed. People suggest, almost reluctantly, that landowners and business organizations focus too much on maximizing profits or "doing what's best only for themselves." People associate this problem with a general breakdown in social values wherein people are more individually greedy than they value community responsibility.

People do not question property rights, . . . but there are both strong generational differences here, and strong differences in the views of people living in central cities, suburbs, and rural areas.

> People in mid- and older adulthood believe that landowners should have the right to do what they deem best with their land. While they may question the decisions of some landowners, they feel there is little they can do in response, except for the community to appeal to and nurture people's sense of responsibility.
>
> The majority of people living in suburbs believe in the "absolute right" of individuals to do as they will with their own property. They are not willing to accord even "the community" with any "right" to attempt to influence individuals on behalf of the common good.
>
> People in younger generations (20-26 years of age) actually tend to question the "right" of landowners to do as they will with their land and waters. They feel more strongly than other age groups that the actions of landowners are resulting in environmental instability. (Note that the group of young adults also has much different perceptions of the state of the environment than those of older people. See below.)
>
> People do not think it appropriate to force others to change through laws and regulations unless landowner or corporate practices clearly are hurting others.

People believe that personal and professional responsibility—*a sense of obligation*—should guide environmental protection and ecosystem management.

> People believe that large corporations or business organizations and landowners have an *obligation* to their surrounding areas and to the next generation to manage environmental resources in a responsible manner, but they do not want new rules and regulations to insure that this happens. People assert that everyone faces too many regulations already.

People make a clear distinction between public and private lands and their respective social roles.

People believe that public lands are growing steadily more scarce, relative to the rest of society, and that these lands play an increasingly important role in maintaining environmental integrity.

> In fact, people from every subregion and every age group believe that public lands (ranging from national forests to city parks) play *the decisive role* in maintaining the environment. Whereas people do not believe that protecting wildlife species is a high priority for private landowners ("birds will find a puddle someplace"), there is "zero tolerance" for anything less than environmental protection on the public lands.

People want an active role in decisionmaking about environmental matters and management of natural resources such as water.

> People believe that entire communities should play a role in finding ways to act on environmental matters or in management of natural resources— not just landowners or policymakers or lawyers and the courts. People make it clear that they do not want "outsiders" simply dictating to them how they should manage the environment, natural resources such as water, and their lives.

Polls and focus group discussions provide good descriptions of people's attitudes and opinions, but they don't allow us to systematically examine the bases for these attitudes and opinions. These descriptive data also have the weakness of being subject to change because people who know relatively little of the subject matter often change their attitudes and opinions as they learn more, as they acquire different information, or as they are asked questions in different kinds of contexts.

For these reasons, several water and land management agencies and social scientists (including the authors of this report) are now starting to conduct intensive surveys of people's *values* associated with natural resource management and the environment. Values are relatively permanent fixtures in people's mental architecture. If we understand people's values better, we are better able to understand how people will react to issues and circumstances, whether or not they are well armed with a particular set of subject matter knowledge. We also are better able to predict what people are willing to do to act on certain beliefs.

There are no in-depth studies of people's values for water in the West or for matters closely related to Western water policy issues at this time.

One of us has completed the first indepth study of people's values for forests and the role of public forest lands in American society. While this study

doesn't directly concern itself with water, it does deal with fundamental values and has the advantage of focusing on those populations moving around the Western landscape (and those remaining in place) and on the different generations involved in the patterns of demographic change.

One important finding of our own study is that there are some significant differences in the perceptions, knowledge levels, beliefs, and values of people of different generations, and in people according to whether they grew up in the cities, suburbs, or rural areas. This is an expected finding, but its particular character is somewhat relevant to Western water policy issues.

There appears to be something of an "age-gap" in knowledge. Older people, particularly in rural areas, know more about the actual status of the environment and about management of natural resources such as water than people in midadulthood. Not surprisingly, analysis of the data seems to indicate this knowledge is acquired primarily through direct experience. People in mid-adulthood (28-45 years of age) score relatively low in overall subject matter knowledge. In contrast to older and midaged adults, people now in college, the military, or extending down in age groups into middle-school are as knowledgeable as older people, although their knowledge appears to have a different character. Younger people (from any location in the West) score as high on overall knowledge as older, rural residents, but they appear to be more knowledgeable of ecology or environmental processes than they are of the actual condition of the environment (or the ways through which it is managed). This difference in knowledge plainly speaks to the difference between experience and formal education.

The major implication of this finding is that people in midadulthood (people to whom current policy issues are likely to be addressed) are likely to have less subject matter knowledge and, thus, have less predictable and more changeable attitudes and opinions about water issues. These people know relatively little, and are likely to be sensitive to whatever information is pervasive at the time. They will form a somewhat fickle audience for people striving to establish water policy. Also, while the bulk of the population professes to be environmentally concerned, people in this particular age group (especially those accounting for a substantial fraction of the current demographic movement) are actually more occupied with earning a living and family matters than they are with environmental matters.

In contrast, people in older generations are as publicly concerned about the environment, but know more, and are more prepared and accustomed to acting on their values and attitudes. These people (the older half of the "Baby Boomers" and their parents) are just now beginning to near retirement age. Some of them are settling in place, but this group also makes up a sizable fraction of the people moving around on the Western landscape. An inordinate number of these people are just starting to move into their chosen

retirement locations, and contrary to every generation preceding them, they are not necessarily "returning home."

People in the generation just now emerging from college know more about ecology and about ecosystem workings, but their basic perceptions of the integrity of the environment are very different than that of preceding generations. People in this group (the group that will come into active maturity during the next 20 years) feel that the environment we all live within has already been compromised. If this perception does not temper with age, water planners and policymakers are in for some interesting times.

Turning to belief systems (the core of a person's value orientation), there is one very important commonality in the belief system of all respondents, regardless of age, residential origin, or experience. This is, perhaps, best displayed in the scale shown in figure 5.

People's responses to the statements presented to them in the survey instrument (shown in figure 5) are strongly "scaled" from the generally biocentric statements at the top of the figure to the generally anthropocentric statements at the bottom of the diagram. One of the implications of the scaled responses is that people place a higher value on the integrity of the environment (and on passing on an intact world to their children) than they place on economic well-being or other matters. Another important implication is that if people come to believe that the integrity of the environment (or any of its associated components) is being jeopardized, policymakers and water planners will have a lot to answer for.

In summary, there are certain beliefs and basic values almost all respondents to indepth surveys appear to hold. These values are invariant in terms of the generation of the respondent, and independent of people's knowledge, attitudes, and opinions. These are the following:

- Public resources (lands and water) should be passed on to future generations in the conditions, size, and extent they are in now (or in better condition and larger extent).
- These resources are growing very scarce, relative to the rest of society. They need to be protected, and they are extremely valuable.
- More resources once universally considered to be private goods (such as water) should be employed in protecting and sustaining the integrity of the physical world.
- It is more important to sustain the integrity of the physical world than it is to keep people in traditional livelihoods and preserve traditional ways of life or traditional communities in the West.

Summary Of Recent Changes

Recent years have brought a considerable amount of change to the West, much of it unanticipated.

The West has grown in terms of overall population. Most of the growth has occurred in California and Texas: two States outsized with regard to the rest of the Nation and poised by birth and immigration rates to become even more so in the future.

Much of the *change* in population patterns has been concentrated in the interior West, particularly in the Mountain States, and to a slightly lesser degree, in the Southwest.

As in earlier periods of the 20th century, population growth in the West results from natural increase, from the influx of people from other States, and from a national concentration of immigration into California.

The most significant changes in the West in recent times are spatial; that is, the way people are grouping themselves on the landscape. In essence, people are concentrating in a relatively small number of urban archipelagos. This trend is likely to continue in the future. The metropolitan areas at the centers of these archipelagos have infrastructures and economies which are likely to cause coalescence of people in the Western landscape for a long time.

People also are drawn to these urban centers by factors having to do with the underlying age structure of the Western population and the Nation as a whole. Older people desire specialized support services for older and elderly people which are found in these areas. Younger people need employment. Immigrants benefit from both the wider array of opportunities and social services characteristic of these areas.

The economy has not been experiencing as substantial a transformation as has the population. In overall character, it continues to expand along lines established earlier in the 1950s. But like the population, overall growth masks more substantial changes which have been taking place in the spatial organization of the economy on the Western landscape.

The intertwined changes in the spatial organization of people and economic activity in the West have significance for water resources planning and management. In some ways, the need for water both for municipal and industrial purposes, and for agriculture, is occurring in different places than anticipated 30 years ago.

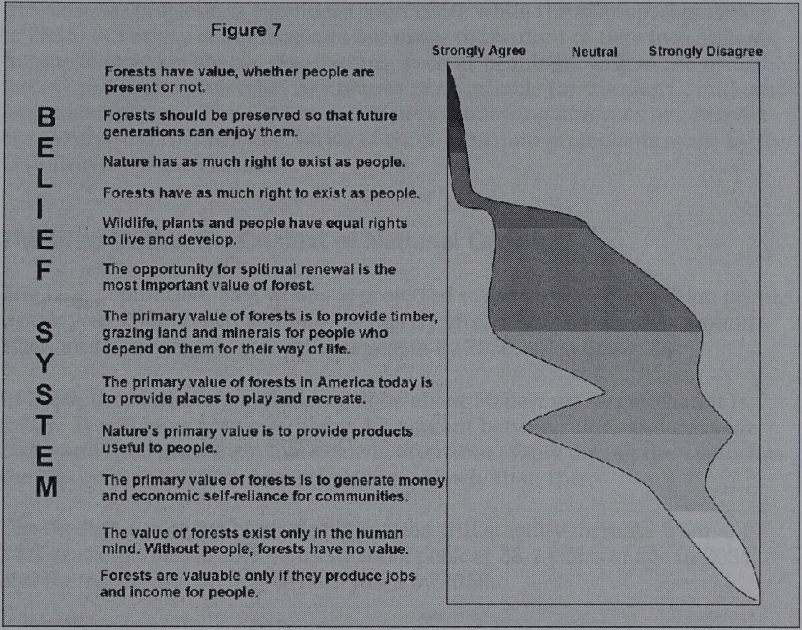

Figure 7

Projected Population Growth

In 1995 and 1996, scientists at the U.S. Bureau of the Census developed a series of projections for population growth to the year 2025, and then to the year 2050. One set of projections was made for the Nation as a whole,[21]and the other was made for States.[22] These projections were made in accord with a program of research and publication conducted by the U.S. Bureau of the Census since 1940.

These most recent projections are based on knowledge of the sex, age, race, and Hispanic origin structure of the national population, and on research into fertility, mortality, and mobility properties affecting each age, sex, and racial segment of the population. The projections are made by constructing

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[21] "Population Projections of the United States by Age, Sex, Race, and Hispanic Origin: 1995 to 2050." Jennifer Cheeseman Day, U.S. Bureau of the Census, Current Population Reports, P25-1130, U.S. Government Printing Office, Washington, DC, 1996.

[22] "Population Projections for States by States By Age, Sex, Race, and Hispanic Origin: 1995 to 2050." Paul R. Campbell, U.S. Bureau of the Census, Population Division, PPL-47. U.S. Government Printing Office, Washington, DC, 1996.

assumptions about fertility, mortality, interstate mobility, and immigration, and making independent projections of how these factors will work in each individual segment of the population. The projections begin in January 1994: the national projections extend through 2050, while the State projections go to 2025. A variety of adjustments are made to the data to take into account unique features of special populations, such as people serving in the armed forces, and to use projection techniques most reliable for the short-, mid- and long-term futures. The data from which the following analyses are derived are taken from the "Middle" series of three alternate projections made by the U.S. Bureau of the Census.

The West Within the Context of National Growth

The U.S. population, as a whole, is projected to increase to 275 million people by the year 2000, reach 300 million shortly after 2010, 350 million around 2030, and then achieve 392 million people by 2050. (See figure 6.)

In 2050, the Nation's population will be about 50 percent larger than it is today. It will have grown by about 4.5 percent between 1995 and the year 2000, and then grow even more slowly after that. Only during the 1930s has the Nation's population ever grown more slowly than this.

The median age of the Nation's population will steadily increase from 34.3 years in 1995 to 35.7 years in 2000, peak at 38.7 years of age in 2035, and then decrease slightly to 38.1 years by 2050.

This increasing median age is driven by the aging of the population born during the Baby Boom after World War II. About 30 percent of the present population was born in this period. As this particular population segment ages, the median age of the Nation rises. People born during the Baby Boom will be between 35 and 54 years old in the year 2000. The first of the Baby Boomers will reach 65 years of age in 2011: they will constitute only about 25 percent of the total population in that year. The last of the Baby Boomers will reach 65 years of age in the year 2029, and then they are projected to constitute only 16 percent of the total U.S. population.

In 1995, children under 5 years of age constituted about 19.6 million people and were as numerous as they have ever been during the last 30 years. Their numbers are projected to decline to fewer than 19 million around the year 2000 and then return to present levels by 2010.

In 1995, there were 49 million youth (people between the ages of 5 and 17) in the school-aged population. This group may increase by about 3 million more people in the year 2000 and then grow by only another 1.7 million in the year 2050.

People just entering the work force, college, or the military typically are 18 to 24 years of age. This group of people was largest in the early 1980s (30 million members) and has since declined to slightly less than 25 million

people today. In the near future, this group will began to grow again. They are projected to increase to 26 million people in the year 2000 and reach 30 million people in 2010.

The number of people between 25 and 34 years of age will decline from 40.9 million in 1995 to 37.2 million people in 2000.

The total population under 45 years of age is projected to increase from 177 million people in 1995 to 190 million people in 2020. But this group's share of the total population will decline from 67 percent in 1995 to 59 percent by the year 2020.

The oldest people in the Nation are projected to increase both in number and as a share of the total population. By the year 2050, this group will have grown from 33.5 million people (12. 8 percent) in 1995 to 79 million people: they then are projected to constitute 20 percent of the population.

The primary source of change in the national population over this long time period is natural increase. (See figure 7.) The number of births in the U.S. is projected to decrease slightly as the century ends, then increase progressively throughout the projection period. The number of births is expected to remain relatively low (or decline slightly) until 2000 as the Baby Boomers finish passing through their childbearing years. Then an increasing number of women are expected to bear children. (These will be the grandchildren of the Baby Boomers.) The number of births are expected to increase throughout the projection period, in 2012, topping the highest birth rate recorded in the 20th century. By 2050, there may be as many as 5.7 million births a year.

Between 1995 and 2050, the total number of deaths each year is expected to increase by 70 percent. There were 2.3 million deaths in 1995: there are expected to be 4 million deaths in 2050. This is true even though life expectancy is assumed to increase over time. But throughout the time period, an increasing number of people will be found in older age groups where mortality is highest.

Net immigration is projected to be an important factor in future population growth, even though it is not as important as natural increase, and it has been assumed by the U.S. Bureau of the Census to remain essentially static at about 820,000 immigrants per year. Immigration is considered to be important because in the year 2000, the total population of the Nation would be about million people larger (2 percent larger) than if no immigration had taken place. By the year 2050, the total U.S. population might include 80 million post-1994 immigrants and their descendants. People in these two generations may constitute 25 percent of the population.

In terms of the States, the South and Far West combined are projected to account for slightly more than 84 percent of the 72 million persons added to the Nation's population over the next 30 years. That is, during the 1995 to 2025 period, the South and Far West are each expected to increase by more than 29 million persons. In contrast, the Midwest is projected to add 7 million persons during the period 1995 to 2025, while the Northeast would add approximately 6 million persons.

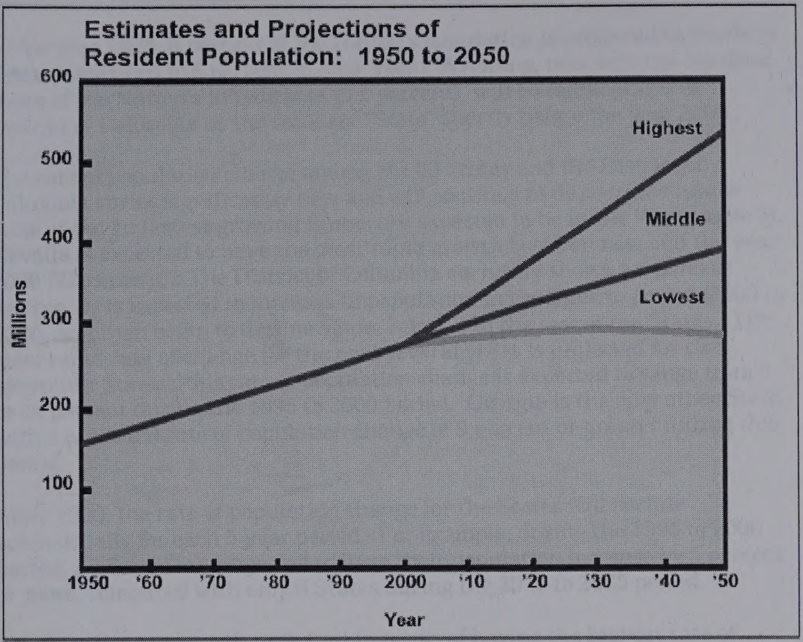
These changes are essentially a continuation of trends began during the 1980s when the South and West accounted for 84 percent of the 22 million persons added to the Nation's population. The average annual change of more than 1 percent for each of these regions has been above the national average of 0.9 percent. The slow population growth of the Northeast and the Midwest is attributed to net internal out-migration to other regions.

California, the most populous State, contained 12 percent of the Nation's population in 1995. By 2025, California is expected to have 15 percent of the Nation's population. From 1995 to 2025, as shown in table 4, California would add 17.7 million people (equivalent to nearly the current population of New York State).

Table 4.—Projections of the top 10 States
ranked by population size
(Population sizes are shown in millions)

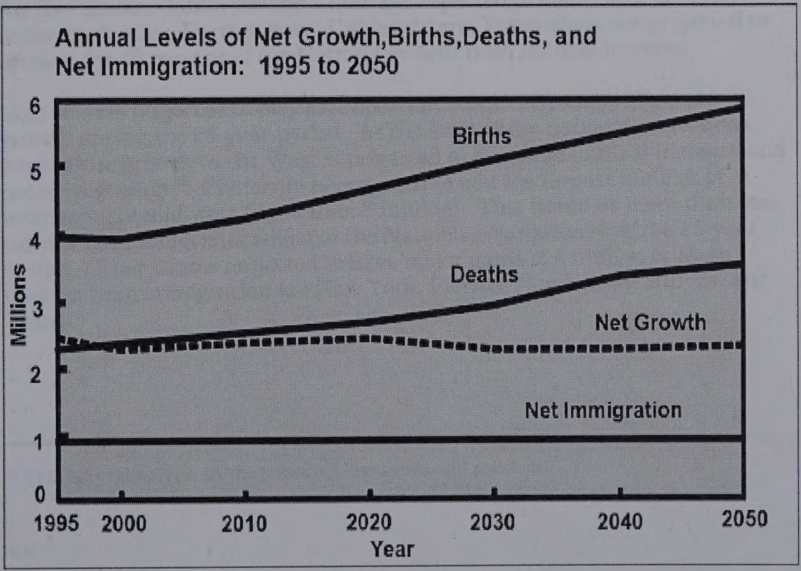
Rank	State in 1995	Population	State In 2025	Population
1	California	31.6	California	49.3
2	Texas	18.7	Texas	27.2
3	New York	18.1	Florida	20.7
4	Florida	14.2	New York	19.8
5	Pennsylvania	12.1	Illinois	13.4
6	Illinois	11.8	Pennsylvania	12.7
7	Ohio	11.2	Ohio	11.7
8	Michigan	9.5	Michigan	10.1
9	New Jersey	7.9	Georgia	9.9
10	Georgia	7.2	New Jersey	9.6

Figure 6



Estimates and Projections of Resident Population: 1950 to 2050

Figure 7



Annual Levels of Net Growth,Births,Deaths, and Net Immigration: 1995 to 2050

In the year 2025, 8 percent of the Nation's population is projected to reside in Texas, compared to 6 percent in New York. Wyoming, now with the smallest share of the Nation's inhabitants (0.2 percent), will be replaced by the District of Columbia as the smallest "State" shortly before the year 2000.

The rate of population change among the 50 States and the District of Columbia varies significantly now and will continue to do so in the future. Nine of the 10 fastest growing States are expected to be in the West (table 5). Nevada is expected to have the most rapid growth between now and the year 2000 (22 percent). The District of Columbia currently shows a 6-percent decline. It is expected to increase in population in the interim period (2000 to 2020) and then begin to decline again, relative to the rest of the States. The most rapid rate of change for the next several years is projected for the Mountain States: this rate of population change is expected to range from 9 to 22 percent during the 1995 to 2000 period. Georgia is the only other State with a projected rate of population change of 9 percent or greater during this period.

After 2000, the rate of population change for the States will decline substantially for each 5-year period. For example, during the 1995 to 2000 period, 25 States are projected to have their population increase by 5 percent or more, compared with only 6 States during the 2020 to 2025 period.

The Western region will rank first in terms of having the highest rate of births but will have the smallest number of deaths. During the 1995 to 2025 period, five States (California, Texas, New York, Florida, and Illinois) are projected to have five million or more births. Four of these States, California, Florida, Texas, and New York will have five million or more deaths. Among the five States, California and Texas are expected to have twice as many births as deaths. Furthermore, California and Texas alone are projected to account for 46 percent of the Nation's growth from natural increase.

Migration is projected to play an important role in regional differences in growth during the 25-year period. At the level of the national projections, most of the growth in the West is projected to be due to natural increase and net immigration.[23] California is projected to add the largest number of international migrants (more than 8 million). This would be more than one-third of the immigrants added to the Nation's population over the 25-year period. Other States projected to have major gains of a million or more persons from immigration are New York, Florida, New Jersey, Illinois, and Texas.

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[23] This isn't quite true, as the following discussion will point out.

Table 5.—Projections of the 10 fastest growing States

1995 to 2000	State
1	Nevada
2	Idaho
3	Arizona
4	Utah
5	Colorado
6	New Mexico
7	Wyoming
8	Georgia
9	Oregon
10	Montana
2020 to 2025	**State**
1	California
2	Hawaii
3	New Mexico
4	Texas
5	Alaska
6	Florida
7	Arizona
8	Washington
9	District of Columbia
10	Oregon
1995 to 2025	**State**
1	California
2	New Mexico
3	Hawaii
4	Arizona
5	Nevada
6	Idaho
7	Utah
8	Alaska
9	Florida
10	Texas

Change Within the West

Overall, between 1995 and the year 2000, the 17 Western States are expected to add 5.427 million people (6.1 percent) to their current population. Between the year 2000 and 2025, they will add about 28 million more people, for a total change of 27.4 percent (or a 33,470,000 net increase). This rate of change represents a small decline over that which has taken place in recent years (approximately 32 percent for the prior 25 years), but it is very much larger than the rate of change for the rest of the Nation.

The eight States currently projected to grow the fastest, as a percentage of current population, in the 5-year period between 1995 and the year 2000 are Nevada, Idaho, Arizona, Utah, Colorado, New Mexico, Wyoming, and Montana. The States expected to grow the fastest in the following 25-year period (between the year 2000 and the year 2025) are California, New Mexico, Texas, Arizona, Washington, Wyoming, Utah, and Idaho. These changing relationships in overall growth are shown in plates 22 and 23.

Components of Change - Migration of People Among the States

The overall rates of growth for the Western States tend to mask the amount of internal change taking place and the sources of change for each State or subregion of the West.

In general, internal migration (that is, migration among all the States in the Nation) accounts for the largest portion of the changes expected to take place in all the Western States. This is true for each of the years in the 25-year time period.

This observation is consistent with Internal Revenue Service data which indicates that over 42 million people moved between March 1992 and March 1993. This amounted to 16.8 percent of the population over one year of age. Analysis of the county-to-county migration figures published by the Internal Revenue Service indicates that the "average American" makes 11.7 moves in a lifetime. Nationwide, most movers (66 percent) stay in the same county. (In fact, 10 percent of the population appears to makes this kind of a move every year.) But, the Internal Revenue Service data, on which these portions of the U.S. Bureau of the Census projections are based, seem to indicate that this rate is much higher and more variable for the Western States.

The maps in plate 24 display the impact of internal migration on each State for the years 1995, 2000, and 2025 as a proportion of their growth in those years. (Another way of stating this is that the display for each State consists of the percent change of that State's total population, in that year, which is attributable to in-migration and to out-migration.) The percent change numbers in the legends for this map series may seem to be relatively small, but these represent annual figures. For any given period of time, the actual amount of internal change is rather large.

As the images show, the interior States consistently experience a large amount of "turnover" in their populations throughout the 25-year period. These States receive many newcomers and export many people, presumably to surrounding States.

Based on the recent past, Nevada and Wyoming are expected to experience much more turnover than the other States. In fact, these data suggest that

these States will have more than 12 percent of their people coming and going every year. In real numbers, Nevada experiences net internal movement of 60,591 people in 1995 (according to these projections), 44,708 people in the year 2000, and 1,943 people in 2025. For purposes of comparison, its population is expected to range between 1,530,000 and 2,312,000 people in those years.

California receives proportionately little in-migration but continues to export people to other States until about the year 2000. That is, it is projected to export 879,380 people in 1995 (while acquiring only 398,912 from other States), 834,054 people in the year 2000 (while acquiring only 450,181 people), and 911,385 people in 2025 (while acquiring 826,211 people from other States). For purposes of comparison, California is exporting numbers of people every year equivalent to the entire population of Montana in those same years.

Texas also experiences some in-migration until about 2015, while it exports relatively few people. For purposes of comparison, Texas is importing people in numbers roughly equivalent to the population of Wyoming in these years.

Components of Change—Natural Increase

The next most important source of change is natural increase. For all Western States, there are more births than deaths. But unlike the case of internal migration described above, the relative impact of this source of change on the individual States is much more varied. The 17 Western States differ considerably in the age and sex structures of their current populations. As a result, some States will experience a substantial impact from births or from deaths in a given time period: either because a relatively large portion of their population is in fertile, childbearing years, or else because a large portion is elderly. Other States will have a closer relationship between births and deaths because their populations are relatively evenly divided between all age and sex structures.

The net impact of births and deaths on the Westerns States over the 25-year period is shown in plate 25. Important differences occur between California, the Northern Great Plains States, Texas and the other Southwestern States, and Oregon over time.

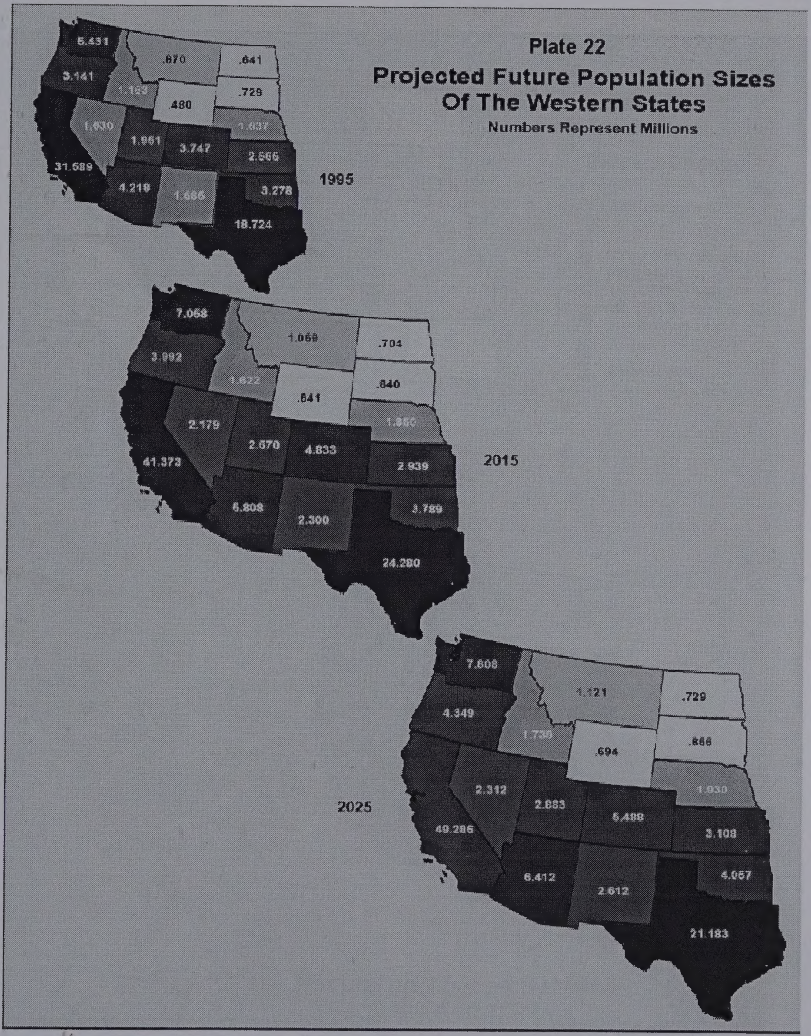


Plate 22

Projected Future Population Sizes Of The Western States

Numbers Represent Millions

1995
5.431
.870
.641
3.141
1.163
.480
.729
1.530
1.637
1.951
3.747
2.566
31.689
4.218
1.686
3.278
18.724
2015
7.058
1.069
.704
3.992
1.622
.840
.641
1.850
2.179
2.670
4.833
2.939
41.373
5.808
2.300
3.789
24.280
2025
7.808
1.121
.729
4.349
1.739
.866
.694
1.930
2.312
2.883
5.188
3.108
49.285
6.412
2.612
4.057
27.183

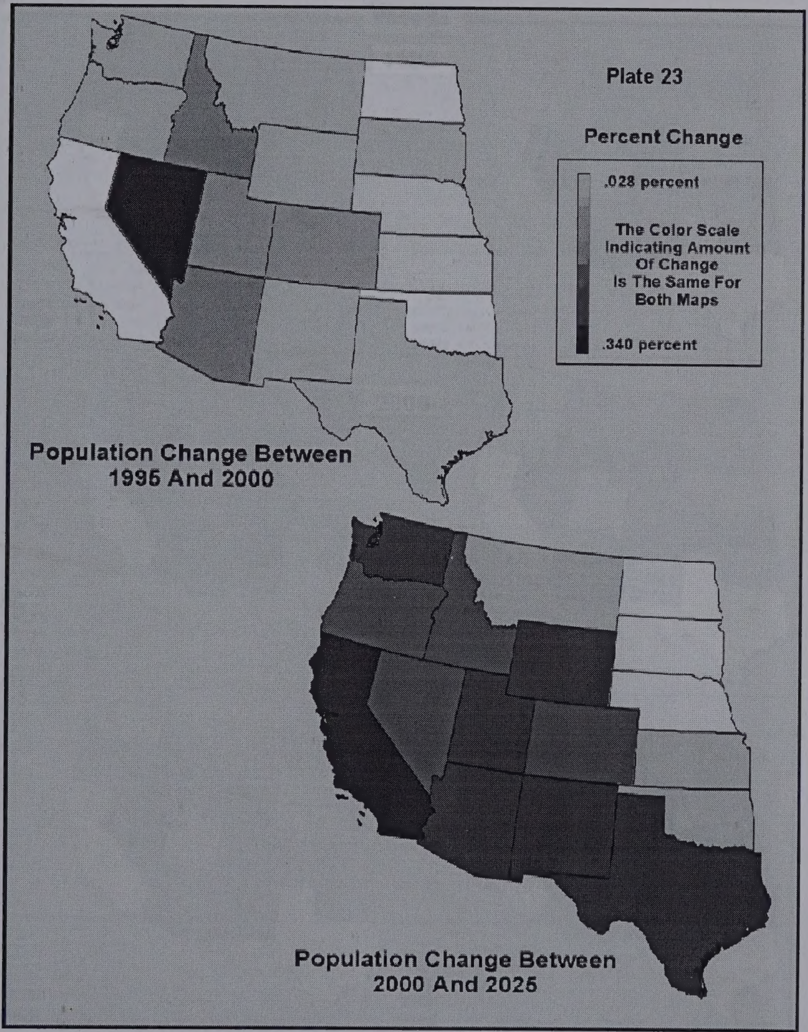


Plate 23

Population Change Between 1995 And 2000

Population Change Between 2000 And 2025

Percent Change
.028 percent
The Color Scale Indicating Amount Of Change Is The Same For Both Maps
.340 percent

Plate 24

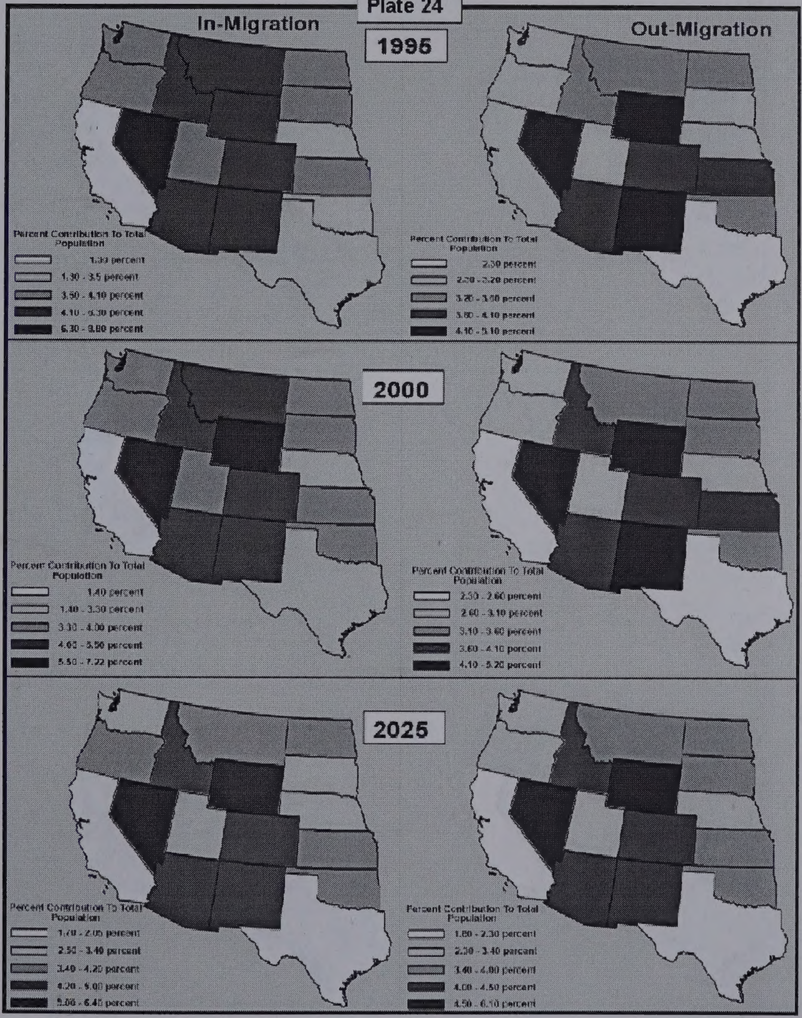
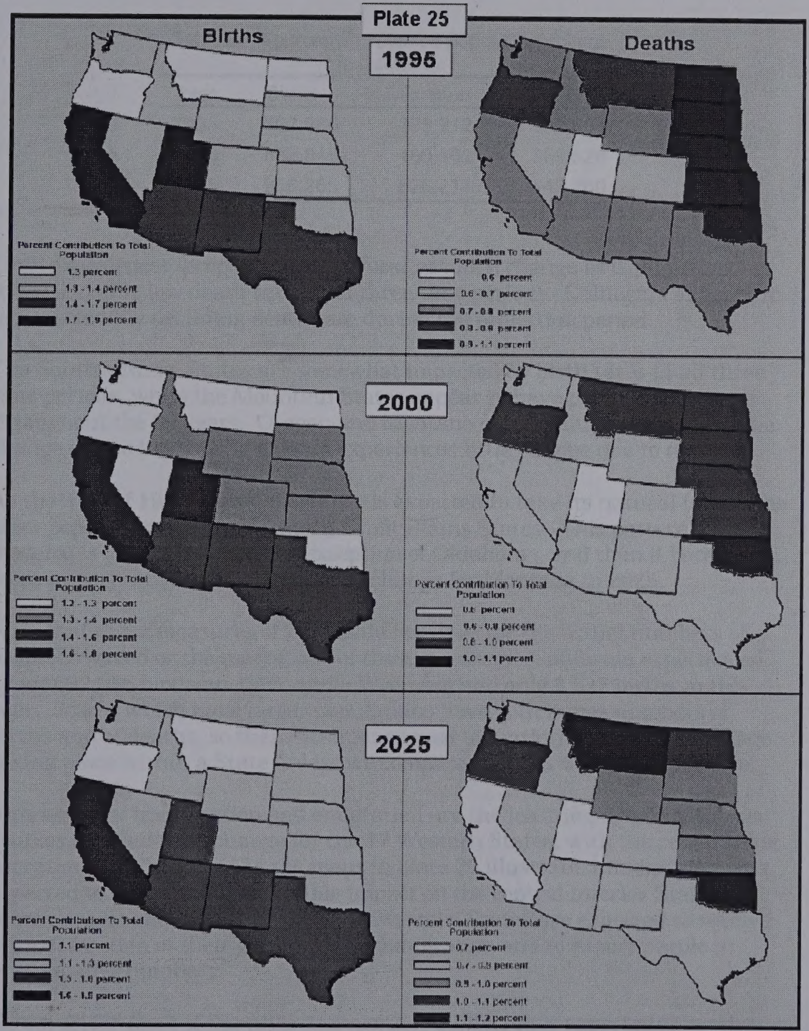

In-Migration
Out-Migration
1995
Percent Contribution To Total Population
1.30 percent
1.30 - 3.5 percent
3.50 - 4.10 percent
4.10 - 6.30 percent
6.30 - 9.80 percent
Percent Contribution To Total Population
2.30 percent
2.20 - 3.20 percent
3.20 - 3.80 percent
3.80 - 4.10 percent
4.10 - 5.10 percent
2000
Percent Contribution To Total Population
1.40 percent
1.40 - 3.30 percent
3.30 - 4.00 percent
4.00 - 5.50 percent
5.50 - 7.22 percent
Percent Contribution To Total Population
2.30 - 2.60 percent
2.60 - 3.10 percent
3.10 - 3.60 percent
3.60 - 4.10 percent
4.10 - 5.20 percent
2025
Percent Contribution To Total Population
1.70 - 2.05 percent
2.52 - 3.40 percent
3.40 - 4.20 percent
4.20 - 5.08 percent
5.08 - 6.45 percent
Percent Contribution To Total Population
1.80 - 2.30 percent
2.30 - 3.40 percent
3.40 - 4.00 percent
4.00 - 4.50 percent
4.50 - 6.10 percent

Plate 25


Births
Deaths
1995
Percent Contribution To Total Population
1.3 percent
1.3 - 1.4 percent
1.4 - 1.7 percent
1.7 - 1.9 percent
Percent Contribution To Total Population
0.6 percent
0.6 - 0.7 percent
0.7 - 0.8 percent
0.8 - 0.9 percent
0.9 - 1.1 percent
2000
Percent Contribution To Total Population
1.2 - 1.3 percent
1.3 - 1.4 percent
1.4 - 1.6 percent
1.6 - 1.8 percent
Percent Contribution To Total Population
0.6 percent
0.6 - 0.8 percent
0.8 - 1.0 percent
1.0 - 1.1 percent
2025
Percent Contribution To Total Population
1.1 percent
1.1 - 1.3 percent
1.3 - 1.6 percent
1.6 - 1.8 percent
Percent Contribution To Total Population
0.7 percent
0.7 - 0.8 percent
0.8 - 1.0 percent
1.0 - 1.1 percent
1.1 - 1.2 percent

In all three time periods, California consistently experiences the most change due to births. Its birth rates for these selected years compare with its in-migration and international migration rates as shown in table 6.

Table 6.—Sources of projected population change in California

Year	Births	In-Migration	Immigration
1995	602,986	398,912	358,661
2000	582,648	450,181	368,528
2025	956,265	826,211	442,360

Utah experiences, proportionally, almost as much change as California, plus it has a visibly low death rate in all three time periods. California appears to have a steadily declining death rate during the projection period.

The Southwestern States are somewhat impacted by birth rates in all three time periods, while the Mountain States appear to have pretty stable rates throughout the 30 years. Oregon and Montana consistently experience little change due to births, and Oregon experiences little change due to deaths.

As the map of 1995 shows, mortality is expected to take its natural toll on the older populations of the Northern Great Plains States. This pattern moderates over time, with the exception of Oklahoma, and then it becomes a more important source of population change for Montana in 2025.

Note that these measures of impact do not describe the actual numbers of people involved or the magnitude of those numbers. California experienced about 602,986 births in 1995, while Wyoming had only 6,537 births in this year. States which have larger populations have both larger numbers of births and of deaths, so their sheer size tends to mask the amount of change taking place within a State unless we compare them as we have done here.

International immigration and emigration are the least important of the six sources of population change for the 17 Western States, with the remarkable exception of California. As the maps in plate 26 illustrate, immigration isn't expected to have much perceptible impact on the central interior States. States nearer the coast and the Southwestern States are expected to receive a small fraction of their growth from immigration and to export people in even smaller numbers.

However, for most of the projection period, California is expected to receive slightly more than 1 percent of its annual population growth from this immigration. As shown earlier in table 6, immigration to California is expected to be equivalent to approximately half its birth rate throughout the

projection period, and equivalent to slightly less than its rate of intake of people from other States.

In conclusion, we remind the reader that these projections, the best available in the United States at the time of this writing, are founded in individual studies of fertility and mortality of individual segments of the national population, in studies of interstate movements of people during the past 30 years, and in assumptions about the nature of international immigration into the United States. They are not based on studies of the unique population processes of individual States, although we have broken them down and employed them in this fashion here.

Census Bureau scientists also make long-term projections of the demographic change based on models which are essentially economic in origin. These have not proven to be as accurate as the technique underlying the projections described in this report, but we have seen, in this report, that subregional economic forces have an important influence on demography. It is likely that this will continue to be true and that the projections described here will not play out in the future exactly as described here for this very reason.

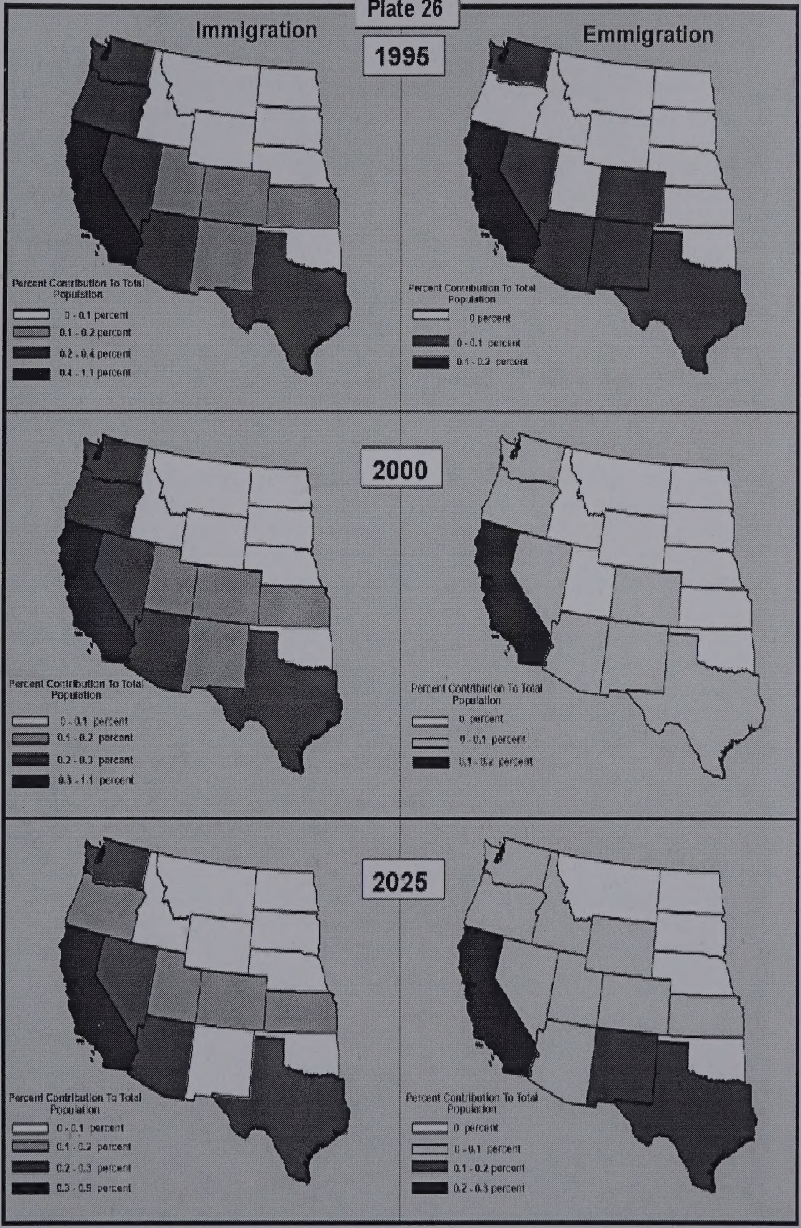
Implications for Water Use and Management

This report has shown that the pace of change is quickening in the West, in terms of its large-scale population and economic processes. The population of the West has grown tremendously in the last 30 years and is projected to keep expanding over the next 25 years. In fact, it will expand relative to all the rest of the Nation, and two Western States, California and Texas, will come to dominate the United States in terms of sheer population size.

Increasing population growth in the West will mean increasing demands for water, particularly for water for municipal and industrial uses.

It is likely that the largest share of future demand for water for all types of uses will be in California, Texas, Nevada, and Utah. California and Texas have significantly larger populations now than almost all States in the Nation, and their populations are projected to grow even more outsized in the future. Both have significant concentrations of agricultural industries. Nevada and Utah, States with relatively moderately sized populations now, are projected to change more substantially in the future than some of the other States. They are somewhat rural in character now, but probably will become significantly urban in the near future. Their needs for water have more to do with the fact that their population growths are relatively unexpected than with the fact that such growth may be large in absolute terms.

Plate 26


Immigration
Emmigration
1995
Percent Contribution To Total Population
0 - 0.1 percent
0.1 - 0.2 percent
0.2 - 0.4 percent
0.4 - 1.1 percent
Percent Contribution To Total Population
0 percent
0 - 0.1 percent
0.1 - 0.2 percent
2000
Percent Contribution To Total Population
0 - 0.1 percent
0.1 - 0.2 percent
0.2 - 0.3 percent
0.3 - 1.1 percent
Percent Contribution To Total Population
0 percent
0 - 0.1 percent
0.1 - 0.2 percent
2025
Percent Contribution To Total Population
0 - 0.1 percent
0.1 - 0.2 percent
0.2 - 0.3 percent
0.3 - 0.9 percent
Percent Contribution To Total Population
0 percent
0 - 0.1 percent
0.1 - 0.2 percent
0.2 - 0.3 percent

People in the West are coalescing into a relatively small number of metropolitan areas. These areas have infrastructures, a wide array of industries, and high levels of economic activities to support their populations. Given that it is often less expansive to expand upon or rebuild existing infrastructures than it is to create new systems in new cities, it seems likely that these metropolitan areas will continue to be the nuclei of population growth and development in the West for the foreseeable future. It also may be that rural populations continue to decline, relative to the buildup of these metropolitan areas.

These observations have certain advantages for water planning and policymaking in that the likely centers of Western population in the future can be known and will be relatively "fixed" within the landscape. Working from the population projections for the States, it may be possible for water planners to estimate the likely shape of demand for water for municipal and industrial purposes for the individual metropolitan areas.

Agriculture around the metropolitan areas and in the coastal counties (which also are relatively heavily populated in comparison to the rest of the West) tends to have higher economic value than it does in the more rural settings of the West. Given the diversity of economies in and near these metropolitan areas, it is likely that a significant proportion of the crops being produced in these areas is exported to (i.e., used for trade and commerce with) other areas. Water used for agricultural purposes in these areas thus does not necessarily go for local consumption, but may have additional economic value as a basis for creation of export commodities. If this is the case, the most interesting changes in the long-standing balance between water use for agriculture, urban, and industrial uses are likely to take place in the western most of the large metropolitan areas.

In the interior areas of the West, the new cities are likely to have more need for local water infrastructure developments than most other regions. Water developments in these areas typically were constructed for agricultural purposes; but these are rural areas suddenly becoming metropolitan within the space of 30 years. The long-term population projections suggest that these places will continue to grow at the same pace as they have in just the last 15 years.

Addendum

State Population Projections by Selected Years

State Population Projections
By Selected Years

State Name	1990	1995	2000	2005	2015	2025
AZ	3665	4218	4798	5230	5808	6412
CA	29760	31589	32521	34441	41373	49285
CO	3294	3747	4168	4468	4833	5188
ID	1006	1163	1347	1480	1622	1739
KS	2476	2565	2668	2761	2939	3108
MT	799	870	950	1006	1069	1121
NE	1578	1637	1705	1761	1850	1930
NV	1202	1530	1871	2070	2179	2312
NM	1515	1685	1860	2016	2300	2612
ND	639	641	662	677	704	729
OK	3145	3278	3373	3491	3789	4057
OR	2842	3141	3397	3613	3992	4349
SD	696	729	777	810	840	866
TX	16986	18724	20119	21487	24280	27183
UT	1723	1951	2207	2411	2670	2883
WA	4866	5431	5858	6258	7058	7808
WY	454	480	525	568	641	694